START

ROLL NO. 3

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL								

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER	SHIP'S NO. 1325	SHIP'S NAME TILLIE LYKES
CO-ORDINATION SECTION SEC. CHIEF	APL MODIFICATION	
	TRIM AND STABILITY CALCULATION (FOR WEATHER CRITERIA)	
DATE (TEL)		
JOB NO. TS:323/24/25 / SCALE	LYKES REF. NO. 290113	MITSUI DRAWING NO. 1102104M

(10 SHEETS WITH COVER)

1

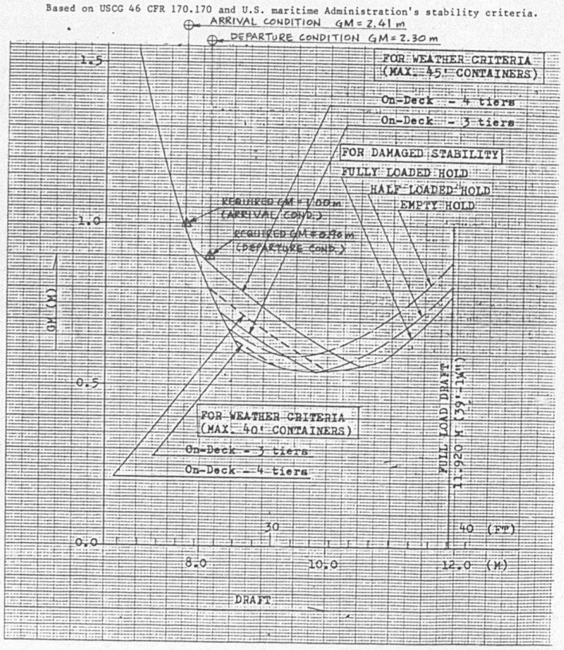
PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. NO. 1323 AS FINISHED PLAN, APPLIED TO S. NO. 1325 "TILLIE LYKES" DUE TO SIMILARITY IN DESIGNING, OUTFITTING AND LIGHTSHIP WEIGHT.	NOV. 10, 1986 K.A.
		ADDED APL'S LOADING CONDITIONS FOR APL MODIFICATION.	MAR. 3, 1987 K.A.

2

REQUIRED GM CURVES

Based on USCG 46 CFR 170.170 and U.S. maritime Administration's stability criteria.



3

TS-1

DEPARTURE CALCULATION

Voyage______ Departure Port______ Arrival Port______ Date______

	Weight Tonnes	L.Moment Fwd (MT)	L.Moment Aft (MT)	VCG (M)	V.Moment (MT)	F.S. Moment (MT)
Operating Lightship	17472	------	250244	-----	213418	62
Containers -Sheet TS-2	14982	294581	388223	-	255298	-
Fuel Oil -Sheet TS-3	3279	35186	79406	-	28845	1459
Diesel Oil -Sheet TS-3	200	-	13555	-	838	368
Fresh Water-Sheet TS-3	375	22512	10593	-	6142	457
Salt Water -Sheet TS-4	1565	119119	-	-	6136	-
Misc. Tanks-Sheet TS-4	-	-	-	-	-	-
1. Totals	37873 a	471398 b	742021 c	13.48 d	510677 e	2346 f

DRAFT AND TRIM CALCULATION	
2. Even Keel Draft (Hydrostatics)	8.13
3. L.Mom. for Trim (1c) - (1b) If (-) then F, if (+) then A	270623 ~~F~~ A
4. LCG (3) ÷ (1a)	7.15 ~~F~~ A
5. LCB (Hydrostatics)	6.39 ~~F~~ A
6. Trim Lever (4) - (5) If (-) the F, if (+) then A	0.76 ~~F~~ A
7. Trim Moment (1a) x (6)	28783
8. Moment to Trim One Meter (Hydrostatics)	69692
9. Trim in Meters (7) ÷ (8)	0.41 ~~F~~ A
10. Change in Draft Fwd per Meter of Trim (Hydrostatics)	0.52
11. Draft Change Fwd (9) x (10)	0.21
12. Draft At Fwd Marks If (9) is (F) then (2) + (11) If (9) is (A) then (2) - (11)	7.92
13. Change in Draft Aft per Meter of Trim (Hydrostatics)	0.47
14. Draft Change Aft (9) x (13)	0.19
15. Draft at Aft Marks If (9) is (F) then (2) - (14) If (9) is (A) then (2) + (14)	8.32
16. Mean Draft [(12) + (15)] ÷ 2	8.12

STABILITY CALCULATION	
18. Change in KM (Hydrostatics) $0.089 \times \frac{0.41}{2.0}$	0.02
19. KM at Even Keel Draft (Hydrostatics)	15.82
20. KM Corrected If (9) is (F) then (19)-(18) If (9) is (A) then (19)+(18)	15.84
21. KG (1d) = (1e) ÷ (1a)	13.48
22. GM Uncorrected (20) - (21)	2.36
23. F.S. Correction (1f) ÷ (1a)	0.06
24. GM Corrected (22) - (23)	2.30
25. GM Required	0.90

Observed	Port	Stbd	Average
Draft Fwd			
Draft Aft			
Midship			
Trim			

1169

TS-2F

CONTAINER STOWAGE SUMMARY
FOR CONTAINER ROWS FWD OF AMIDSHIP

Voyage__________ Departure Port__________ Arrival Port__________ Date__________

Row	No. Containers			Weight* Tonnes	V.Moment* (MT)	LCG M - ⊠	Fwd L.Moment (MT)
	20's	40's	45's				
1 Above Dk	----	65	----	442	11176	84.95 F	37548 F
	----	----				84.95 F	F
1 Below Dk	----	14	----	210	2876	84.95 F	17840 F
2 Above Dk	10	----	----	46	1152	74.19 F	3413 F
	----	55	----	374	9456	70.36 F	26315 F
	----	----				70.36 F	F
2 Below Dk	----	30	----	450	5796	71.12 F	32004 F
3 Above Dk	10	----	----	46	1152	66.53 F	3060 F
4 Above Dk	----	65	----	442	11176	55.43 F	24500 F
	----	----				55.43 F	F
4 Below Dk	----	40	----	600	7115	55.43 F	33258 F
5 Above Dk	10	----	----	46	1152	44.67 F	2055 F
	----	55	----	374	9456	40.84 F	15274 F
	----	----				40.84 F	F
5 Below Dk	60	----	----	600	7186	44.67 F	26802 F
6 Above Dk	10	----	----	46	1152	37.01 F	1702 F
6 Below Dk	60	----	----	600	7186	37.01 F	22206 F
7 Above Dk	----	65	----	442	11176	25.91 F	11452 F
	----	----				25.91 F	F
7 Below Dk	----	54	----	810	8646	25.91 F	20987 F
8 Above Dk	----	65	----	442	11176	11.32 F	5003 F
	----	----				11.32 F	F
8 Below Dk	----	----	58	986	10580	11.32 F	11162 F
TOTALS FWD	160	508	58	6956	117609		294581 F

* Weight and vertical moment of each row are summed on the Container Stowage Sheets.

LCG's for container stacks aft of amidships are listed on the following page.

TS-2A

CONTAINER STOWAGE SUMMARY
FOR CONTAINER ROWS AFT OF AMIDSHIP

Voyage__________ Departure Port__________ Arrival Port__________ Date__________

Row	No. Containers			Weight* Tonnes	V.Moment* (MT)	LCG M - ⊠	Aft L.Moment (MT)
	20's	40's	45's				
9 Above Dk	----	65	----	442	11176	3.61 A	1596 A
	----	----				3.61 A	A
9 Below Dk	----	60	----	900	9010	3.61 A	3249 A
10 Above Dk	----	65	----	442	11176	18.20 A	8044 A
	----	----				18.20 A	A
10 Below Dk	----	----	60	1020	10690	18.20 A	18564 A
11 Above Dk	----	65	----	442	11176	33.12 A	14639 A
	----	----				33.12 A	A
11 Below Dk	----	60	----	900	9010	33.12 A	29808 A
12 Above Dk	----	65	----	442	11176	48.67 A	21512 A
	----	----				48.67 A	A
12 Below Dk	----	58	----	870	8915	48.67 A	42343 A
13 Above Dk	46	----	----	232	5229	62.54 A	14509 A
14 Above Dk	----	34	----	306	6758	72.23 A	22102 A
15 Above Dk	----	65	----	442	11176	92.88 A	41053 A
	----	----				92.88 A	A
15 Below Dk	----	28	----	420	5819	92.88 A	39010 A
16 Above Dk	----	65	----	442	11176	107.13 A	47351 A
	----	----				107.13 A	A
16 Below Dk	----	18	----	270	4058	107.13 A	28925 A
17 Above Dk	36	----	----	228	5572	118.37 A	26988 A
	----		----			121.75 A	A
18 Above Dk	36	----	----	228	5572	125.13 A	28530 A
TOTALS AFT	118	648	60	8026	137689		388223 A
TOTALS FWD	160	508	58	6956	117609		294581 F
TOTALS	278	1156	118	14982	255298		

* Weight and vertical moment of each row are summed on the Container Stowage Sheets.

Enter "TOTALS FWD" from the previous sheet.

TS-3

TANK CAPACITIES - FUEL OIL, DIESEL OIL, FRESH WATER Date__________

FUEL OIL (Specific Gravity = 0.9845)

TANK	Weight - Tonnes		LCG (M)	L.Moment		VCG* (M)	V.Moment		Free Surface		
	98%	Actual		Actual	98%		Actual	98%	98%	Slack	Actual
NO.3 F.W. F.O.T. P	450.3	450.3	25.76F	11600 F	11,600F	8.57	3859	3,859	22	37	22
NO.3 F.W. F.O.T. S	450.3	450.3	25.76F	11600 F	11,600F	8.57	3859	3,859	22	37	22
NO.3 A.W. F.O.T. P	547.8	547.8	10.94F	5993 F	5,993F	8.78	4810	4,810	27	27	27
NO.3 A.W. F.O.T. S	547.8	547.8	10.94F	5993 F	5,993F	8.78	4810	4,810	27	27	27
Total L.Moment Fwd				35186 F	35,186F						
DEEP F.O.T. P	461.6	461.6	62.01A	28624 A	28,624A	7.88	3637	3,637	5	550	550
DEEP F.O.T. S	469.1	469.1	62.83A	29474 A	29,474A	8.26	3875	3,875	11	552	552
H.F.O. SETT. T. P	116.4	116.4	60.57A	7050 A	7,050A	10.40	1211	1,211	157	157	157
H.F.O. SETT. T. S	115.6	115.6	60.53A	6997 A	6,997A	11.52	1332	1,332	81	81	81
H.F.O. SERV. T.	119.8	119.8	60.61A	7261 A	7,261A	12.12	1452	1,452	21	26	21
Total L.Moment Aft				79406 A	79,406A						
TOTALS	3,279	3279					28845	28,845	373	1,494	1459

DIESEL OIL (Specific Gravity = 0.870)

TANK	Weight - Tonnes		LCG (M)	L.Moment		VCG (M)	V.Moment		Free Surface		
	98%	Actual		Actual	98%		Actual	98%	98%	Slack	Actual
DIESEL OIL T. P	73.9	73.9	66.28A	4898 A	4,898A	1.56	115	115	238	267	267
DIESEL OIL T. S	86.1	86.1	69.36A	5972 A	5,972A	1.52	131	131	86	93	93
D.O. SETT. T.	20.1	20.1	67.30A	1353 A	1,353A	13.06	263	263	4	4	4
D.O. SERV. T.	19.8	19.8	67.28A	1332 A	1,332A	16.62	329	329	4	4	4
TOTALS	200	200		13555 A	13,555A		838	838	332	368	368

FRESH WATER (Specific Gravity = 1.000)

TANK	Weight - Tonnes		LCG (M)	L.Moment		VCG (M)	V.Moment		Free Surface	
	100%	Actual		Actual	100%		Actual	100%	Slack	Apply
NO.1 POT. W.T. P	116.5	116.5	96.62F	11256 F	11,256F	17.44	2032	2,032	219	219
NO.1 POT. W.T. S	116.5	116.5	96.62F	11256 F	11,256F	17.44	2032	2,032	219	219
Total L.Moment Fwd				22512 F	22,512F					
NO.2 POT. W.T.	111.4	111.4	73.09A	8142 A	8,142A	14.95	1665	1,665	14	14
DIST. W.T.	30.6	30.6	80.10A	2451 A	2,451A	13.51	413	413	5	5
Total L.Moment Aft				10593 A	10,593A					
TOTALS	375	375					6142	6,142	457	457

* Use Tank VCG Tables on page 13. Determine the VCG by rounding off the weight to the next highest 100 tonnes. Interpolation is not necessary.

TS-4

SALT WATER BALLAST, MISCELLANEOUS TANKS Date__________

SALT WATER BALLAST (Specific Gravity = 1.025)

TANK	Weight - Tonnes		LCG (M)	L.Moment		VCG* (M)	V.Moment		Free Surface	
	100%	Actual		Actual	100%		Actual	100%	Slack	Apply
DEEP W.B.T.	380.7	0	110.28F	0 F	41,984F		0	3,514	371	0
NO.1 BTM. W.B.T.	1,565.3	1565.3	76.10F	119119 F	119,119F	3.92	6136	6,136	9,422	
NO.2 F. W.B.T. P	565.8	0	55.07F	0 F	31,159F		0	4,028	287	
NO.2 F. W.B.T. S	565.8		55.07F	F	31,159F			4,028	287	
NO.2 A. W.B.T. P	789.1		40.20F	F	31,722F			5,232	1,131	
NO.2 A. W.B.T. S	790.0		40.24F	F	31,790F			5,238	1,138	
NO.3 BTM. W.B.T. P	412.7		16.74F	F	6,909F	0.98		404	2,503	
NO.3 BTM. W.B.T. S	412.7		16.74F	F	6,909F	0.98		404	2,503	
Total L.Moment Fwd				119119 F	300,751F					
NO.4 F.W. W.B.T. P	480.8	0	3.83A	0 A	1,837A		0	4,140	23	0
NO.4 F.W. W.B.T. S	480.8		3.83A	A	1,837A			4,140	23	
NO.4 BTM. W.B.T. P	623.6		12.19A	A	7,602A	0.92		574	4,995	
NO.4 BTM. W.B.T. S	623.6		12.19A	A	7,602A	0.92		574	4,995	
NO.4 A.W. W.B.T. P	605.6		18.56A	A	11,240A			5,184	28	
NO.4 A.W. W.B.T. S	605.6		18.56A	A	11,240A			5,184	28	
NO.5 BTM. W.B.T. P	531.7		40.47A	A	21,518A	0.96		510	3,932	
NO.5 BTM. W.B.T. S	531.7		40.47A	A	21,518A	0.96		510	3,932	
NO.5 WING W.B.T. P	566.6		34.50A	A	19,548A			4,901	27	
NO.5 WING W.B.T. S	566.6		34.50A	A	19,548A			4,901	27	
NO.6 WING W.B.T. P	580.2		91.13A	A	52,874A			5,843	828	
NO.6 WING W.B.T. S	580.2		91.13A	A	52,874A			5,843	828	
AFT PEAK T. P	453.4		118.16A	A	53,574A			5,495	2,982	
AFT PEAK T. S	462.0		118.29A	A	54,650A			5,604	3,115	
ANTI-HEELING T. P	615.9		49.83A	A	30,690A			5,007	158	
ANTI-HEELING T. S	615.9		49.83A	A	30,690A			5,007	158	
Total L.Moment Aft				0 A	398,842A					
TOTALS	14,406	1565					6136	92,401	43,721	0

MISCELLANEOUS TANKS (Specific Gravity = 1.000)

TANK	Weight - Tonnes		LCG (M)	L.Moment		VCG (M)	V.Moment		Free Surface	
	100%	Actual		Actual	100%		Actual	100%	Slack	Apply
SOOT CLEAN WATER T.	40.9	0	78.41A	0 A	3,207A	9.57	0	391	9	0
CLEAN DRAIN T.	17.8		78.14A	A	1,391A	1.68		30	6	
WASTE OIL T.	17.8		65.60A	A	1,168A	2.01		36	36	
BILGE T.	62.4		87.13A	A	5,437A	1.41		88	153	
TOTALS	139	0		0 A	11,203A		0	345	204	0

* Use Tank VCG Tables on page 13. Determine the VCG by rounding off the weight to the next highest 100 tonnes. Interpolation is not necessary.

TS-6

ARRIVAL CALCULATION

Voyage________ Departure Port________ Arrival Port________ Date________

Item	Weight Tonnes	L.Moment Fwd (MT)	L.Moment Aft (MT)	VCG (M)	V.Moment (MT)	F.S.M. (MT)
Departure Condition	37873	471398	742021	13.48	510677	2346
±Weight Changes since departure:						
FO Tank No.3 F.W. P	-450	-11600			-3859	-22
FO Tank No.3 F.W. S	-450	-11600			-3859	-22
FO Tank No.3 A.W. P	-548	-5993			-4810	-27
FO Tank No.3 A.W. S	-548	-5993			-4810	-27
FO Tank DEEP P	-316		-19596	7.88	-2490	–
FO Tank DEEP S	-323		-20294	8.26	-2668	–
DO Tank P	-66		-4374	1.56	-103	–
DO Tank S	-78		-5410	1.52	-119	–
DO Tank						
SW Tank No.3 BTM. P	+413	+6909			+404	0
SW Tank No.3 BTM. S	+413	+6909			+404	0
SW Tank						
FW Tank No.1 P.W. P	-105	-10145		17.44	-1831	-
FW Tank No.1 P.W. S	-105	-10145		17.44	-1831	-
FW Tank No.2 P.W.	-100		-7309	14.95	-1495	-
1. Total at Arrival	35610 a	429740 b	685038 c	13.58 d	483610 e	2248 f

Item	Value	Item	Value
2. Even Keel Draft (Hydrostatics)	7.75	18. Change in KM $0.110 \times \frac{0.43}{2.0}$ (Hydrostatics)	0.02
3. L.Mom. for Trim (1c) - (1b) If (-) then F, if (+) then A	255298 F/A		
4. LCG (3) ÷ (1a)	7.17	19. KM at Even Keel Draft (Hydrostatics)	16.03
5. LCB (Hydrostatics)	6.37 F/A		
6. Trim Lever (4) - (5) If (-) then F, if (+) then A	0.80 F/A	20. KM Corrected If (9) is (F) then (19) - (18) If (9) is (A) then (19) + (18)	16.05
7. Trim Moment (1a) x (6)	28488 F/A		
8. Moment to Trim one Meter (Hydrostatics)	66769		
9. Trim in Meters (7) ÷ (8)	0.43 F/A	21. KG (1d) = (1e) ÷ (1a)	13.58
10. Change in Draft Fwd per Meter of Trim (Hydrostatics)	0.52	22. GM uncorrected (20) - (21)	2.47
		23. F.S. Correction (1f) ÷ (1a)	0.06
11. Draft Change Fwd (9) x (10)	0.22	24 GM Corrected (22) - (23)	2.41
12. Draft at Fwd Marks If (9) is (F) then (2) + (11) If (9) is (A) then (2) - (11)	7.53	25. GM Required	1.00
13. Change in Draft Aft per Meter of Trim (Hydrostatics)	0.47		
14. Draft Change Aft (9) x (13)	0.20		
15. Draft at Aft Marks If (9) is (F) then (2) - (14) If (9) is (A) then (2) + (14)	7.95		
16. Mean Draft [(12) + (15)] ÷ 2	7.74		

CALCULATION FOR WIND HEEL REQUIRED GMt

(For Cases Other Than Those Given on p. 16)

DEPARTURE PORT: ________ VOYAGE: ________

DESTINATION PORT: ________ DATE: ________

Base Condition: 3 High Containers on Deck

Use the Table which corresponds to this Base condition.
:p. 17 & 18 when all rows are stacked at least 1-high.
:p. 19 & 20 when all rows are stacked at least 2-high.
:p. 21 & 22 when all rows are stacked at least 3-high.
:p. 23 when all rows are stacked at least 4-high.

	DEPARTURE	DAILY	ARRIVAL
① LCF Draft	8.13 M	8.12 M	7.75 M
② Draft ① rounded UP to the nearest integer	9.0 M	9.0 M	8.0 M
③ Base Condition GMt Required at Draft ② (read from table. pp. 17, 18, 19, 20, 21, 22 or 23)	0.58 M	0.58 M	0.71 M
④ Draft ① rounded DOWN to the nearest integer	8.0 M	8.0 M	7.0 M
⑤ Base Condition GMt Required at Draft ④ (read from table. pp. 17, 18, 19, 20, 21, 22 or 23)	0.71 M	0.71 M	0.88 M
⑥ GMt Adjustment = [②-①] x [⑤-③]	0.11 M	0.11 M	0.04 M
⑦ Base Condition GMt ① = ③ + ⑥	0.69 M	0.69 M	0.75 M

READ ADJUSTMENT FACTORS USING DRAFT ④ (pp. 17, 18, 19, 20, 21, 22 or 23)

ROW	NO. OF TIERS IN ROW	DEPARTURE ADJUSTMENT FACTOR	DAILY ADJUSTMENT FACTOR	ARRIVAL ADJUSTMENT FACTOR
1	5	1.7251	1.7251	1.7567
2	5	1.7251	1.7251	1.7567
4	5	1.7251	1.7251	1.7567
5	5	1.7251	1.7251	1.7567
7	5	1.7251	1.7251	1.7567
8	5	1.7251	1.7251	1.7567
9	5	1.7251	1.7251	1.7567
10	5	1.7251	1.7251	1.7567
11	5	1.7251	1.7251	1.7567
12	5	1.7251	1.7251	1.7567
13	4	0.3769	0.3769	0.3847
14	3	–	–	–
15	5	1.7251	1.7251	1.7567
16	5	1.7251	1.7251	1.7567
17	3	–	–	–

	DEPARTURE	DAILY	ARRIVAL
⑧ SUM OF FACTORS	21.0781	21.0781	21.4651
⑨ Read $\frac{P}{\tan\theta \times \text{Displ.}}$ Factor at Draft ④ (pp. 17, 18, 19, 20, 21, 22 or 23)	0.009736 M	0.009736 M	0.01152 M
⑩ WIND HEEL REQUIRED GMt = ⑦ + [⑧ x ⑨] =	0.90 M	0.90 M	1.00 M

REFERENCE DRAWING: DWG. NO. 1102102M "TRIM AND STABILITY BOOKLET"

1171

APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	19 NOV. 86	OFF3/ALSS-1290						

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER

SHIP'S NO. **1325** SHIP'S NAME **TILLIE LYKES**

CO-ORDINATION SECTION

SEC. CHIEF / ASSIST. CHIEF / STAFF

SOUNDING TABLES

DATE (TEL)

JOB NO. TS1323/24/25 | SCALE | LYKES REF. NO. 290114 | MITSUI DRAWING NO. 1102054 A

(100 SHEETS WITH COVER)

1

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. NO. 1325 AS FINISHED PLAN.	SEP. 26, 1986 K.A.
A		ADDED ULLAGE DEPTH FOR H.F.O. SETT. T. (P & S) AND H.F.O. SERV. T.	MAY 6 '87

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GENERAL NOTES

1. The sounding show the depth to the liquid level at sounding pipe. (Refer to SKETCH on next page)

2. Method of trim correction

   The tables are prepared for the even keel.
   So, if there is any trim, the volume is to be corrected with "CORRECTION TABLE DUE TO TRIM ONE (1) M" on pages 9 and 10.

   EXAMPLE:-
   To get the actual capacity of NO.2 F. W.B.T. (P) when the reading of sounding is 8.5 M and the ship floats with trim 0.5 M by the stern.

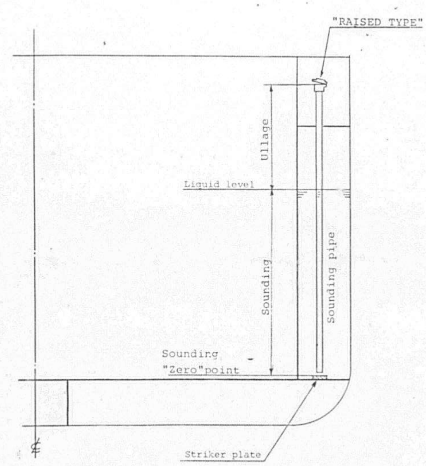
Reading of sounding	8.500
Sounding correction due to trim -0.026 x 0.5 =	-0.013
Corrected sounding	8.487 M

   By applying this corrected sounding to the sounding table, actual capacity may be found as 342.3 CUB.M

3. Using numerals

   Specific gravity of salt water : 1.025
   Specific gravity of fresh water : 1.000
   1 CUB.M = 6.2898 BARREL

SKETCH OF SOUNDING PIPES



TANK CAPACITY TABLE

WATER BALLAST TANKS

S.G.= 1.025

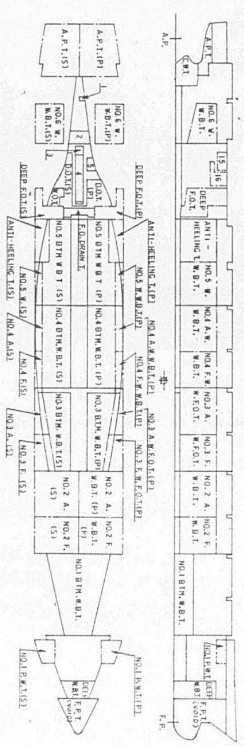
COMPARTMENT		LOCATION (FR.NO.)	CAPACITY 100% (M^3)	WEIGHT 100% (MT)	CENTER OF GRAVITY (M) LCG	VCG	TCG	MAX.F.S. (MT-M)
DEEP W.B.T.		287-296	371.4	380.7	-110.28	9.23	0.0	371
NO.1 BTM. W.B.T.		230-266	1527.1	1565.3	-76.10	3.92	0.0	9422
NO.2 F. W.B.T.	P	214-230	552.0	565.8	-55.07	7.12	-10.07	287
	S	214-230	552.0	565.8	-55.07	7.12	10.07	287
NO.2 A. W.B.T.	P	194-214	769.9	789.1	-40.20	6.63	-10.88	1131
	S	194-214	770.7	790.0	-40.24	6.63	10.87	1138
NO.3 BTM. W.B.T.	P	160-194	402.6	412.7	-16.74	0.98	-7.37	2503
	S	160-194	402.6	412.7	-16.74	0.98	7.37	2503
NO.4 F.W. W.B.T.	P	142-158	469.1	480.8	3.82	8.61	-14.74	23
	S	142-158	469.1	480.8	3.82	8.61	14.74	23
NO.4 BTM. W.B.T.	P	122-158	608.4	623.6	12.19	0.92	-8.94	4995
	S	122-158	608.4	623.6	12.19	0.92	8.94	4995
NO.4 A.W. W.B.T.	P	122-142	590.8	605.6	18.56	8.56	-14.75	28
	S	122-142	590.8	605.6	18.56	8.56	14.75	28
NO.5 BTM. W.B.T.	P	84-122	518.7	531.7	40.47	0.96	-8.12	3932
	S	84-122	518.7	531.7	40.47	0.96	8.12	3932
NO.5 WING W.B.T.	P	103-122	552.8	566.6	34.50	8.65	-14.73	27
	S	103-122	552.8	566.6	34.50	8.65	14.73	27
NO.6 WING W.B.T.	P	31- 50	566.0	580.2	91.13	10.07	-11.29	828
	S	31- 50	566.0	580.2	91.13	10.07	11.29	828
AFT PEAK T.	P	A.E.-16	442.3	453.4	118.16	12.12	-5.65	2982
	S	A.E.-16	450.7	462.0	118.29	12.13	5.56	3115
ANTI-HEELING T.	P	84-103	600.9	615.9	49.83	8.13	-14.21	158
	S	84-103	600.9	615.9	49.83	8.13	14.21	158
TOTAL			14054.7	14406.3	-	-	-	-

FRESH WATER TANKS

S.G.= 1.000

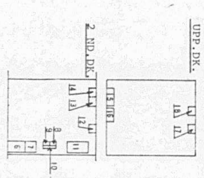
COMPARTMENT		LOCATION (FR.NO.)	CAPACITY 100% (M^3)	WEIGHT 100% (MT)	CENTER OF GRAVITY (M) LCG	VCG	TCG	MAX.F.S. (MT-M)
NO.1 POT. W.T.	P	268-279	116.5	116.5	-96.62	17.44	-10.64	219
	S	268-279	116.5	116.5	-96.62	17.44	10.64	219
NO.2 POT. W.T.		58- 69	111.4	111.4	73.09	14.95	14.69	14
DIST. W.T.		54- 58	30.6	30.6	80.10	13.51	-14.75	5
TOTAL			375.0	375.0	-	-	-	-
COOL. W.T.		A.E.- 21	90.1	90.1	109.45	4.60	0.00	11

TANK ARRANGEMENT



UPP.DK.

2 ND.DK.



NO	TANK NAME	NO	TANK NAME
1	S/T L.O.DRAIN T.	11	H.F.O.SETT.T.(P)
2	BILGE TANK	12	D.O.SETT.T.
3	BTM.RESERVE L.O.T.	13	SOOT CLEAN W.T.
4	BTM.L.O.SUMP.T.	14	DIST.W.T.
5	CLEAN DRAIN T.	15	CYL.O.STOR.T.
6	H.F.O.SETT.T.(S)	16	NO.2 P.W.T.
7	H.F.O.SERV.T.	17	D.O.SERV.T.
8	D.O.SLUDGE T.	18	M/E L.O.STOR.T.
9	H.F.O.SLUDGE T.		
10	L.O.SLUDGE T.		

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FUEL OIL TANKS

H(HEAVY OIL) : S.G.= 0.980
I(INTERMEDIATE OIL): S.G.= 0.940

COMPARTMENT		LOCATION (FR.NO.)	CAPACITY 100% EXCEPT * (M³)	WEIGHT 98% OR * (MT) H	I	CENTER OF GRAVITY (M) LCG	VCG	TCG	MAX.F.S. (MT-M) H	I
NO.3 F.W. F.O.T.	P	178-194	466.7	448.2	429.9	-25.76	8.43	-14.17	37	36
	S	178-194	466.7	448.2	429.9	-25.76	8.43	14.17	37	36
NO.3 A.W. F.O.T.	P	158-178	567.8	545.3	523.1	-10.94	8.65	-14.65	26	25
	S	158-178	567.8	545.3	523.1	-10.94	8.65	14.65	26	25
DEEP F.O.T.	P	70- 83	* 468.9	459.5	440.8	62.01	7.88	-12.32	548	525
	S	70- 83	* 476.5	467.0	447.9	62.83	8.26	12.36	550	527
H.F.O. SETT. T.	P	78- 83	* 118.2	115.8	111.1	60.57	10.40	-9.49	156	149
	S	78- 83	* 117,4	115.1	110.4	60.53	11.52	12.69	80	77
H.F.O. SERV. T.		78- 83	* 121.7	119.3	114.4	60.61	12.12	7.71	25	24
TOTAL			3371.7	3263.7	3130.6	-	-	-	-	
F.O. DRAIN T.		79- 83	56.5	54.3	52.0	60.41	1.05	0.0	349	335
H.F.O. SLUDGE T.		78- 80	* 1.7	1.7	1.6	61.70	7.13	1.85	2	2

DIESEL OIL TANKS

S.G.= 0.900

COMPARTMENT		LOCATION (FR.NO.)	CAPACITY 100% EXCEPT * (M³)	WEIGHT 98% OR * (MT)	CENTER OF GRAVITY (M) LCG	VCG	TCG	MAX.F.S. (MT-M)
DIESEL OIL T.	P	66- 79	86.7	76.5	66.27	1.54	-4.68	276
	S	54- 79	101.0	89.1	69.33	1.50	3.93	96
D.O. SETT. T.		70- 74	* 23.1	20.8	67.30	13.06	-14.75	5
D.O. SERV. T.		70- 74	* 22.8	20.5	67.28	16.62	-14.75	5
TOTAL			233.6	206.9	-	-	-	-
D.O. SLUDGE T.		78- 80	* 1.5	1.4	61.70	7.13	-0.39	1

LUB. OIL TANKS

S.G.= 0.900

COMPARTMENT	LOCATION (FR.NO.)	CAPACITY 100% EXCEPT * (M³)	WEIGHT 98% OR * (MT)	CENTER OF GRAVITY (M) LCG	VCG	TCG	MAX.F.S. (MT-M)
M/E L.O. STOR. T.	62- 66	60.8	53.6	73.70	15.19	-14.75	5
BTM. RESERVE L.O.T.	51- 77	56.6	49.9	74.62	0.53	0.0	41
BTM. L.O. SUMP. T.	55- 76	47.9	42.2	72.53	1.23	0.0	33
TOTAL		165.3	145.7	-	-	-	-
L.O. SLUDGE T.	80- 82	* 3.2	2.9	60.10	7.13	0.79	11
S/T L.O. DRAIN T.	29- 34	5.9	5.2	98.88	2.07	0.0	2
CYL.O. STOR. T.	54- 62	59.9	52.8	78.50	17.03	14.75	10

MISCELLANEOUS TANKS

S.G.= 1.000

COMPARTMENT	LOCATION (FR.NO.)	CAPACITY 100% (M³)	WEIGHT 100% (MT)	CENTER OF GRAVITY (M) LCG	VCG	TCG	MAX.F.S. (MT-M)
SOOT CLEAN WATER T.	54- 62	40.9	40.9	78.41	9.57	-14.53	9
CLEAN DRAIN T.	54- 62	17.8	17.8	78.14	1.68	-3.54	6
WASTE OIL T.	70- 78	17.8	17.8	65.60	2.01	7.78	36
BILGE T.	44- 50	62.4	62.4	87.13	1.41	0.0	153

Notes : 1. The capacities with * mark shows the value to overflow pipe.
2. Weights for FO, DO and LO are at 98% full unless capacity has * mark where weight is calculated to overflow pipe.

CORRECTION TABLE DUE TO TRIM ONE(1) M

(UNIT : MM)

T A N K	SOUNDING DEPTH (M) 2.0	4.0	6.0	8.0	10.0	12.0	14.0	—	—
DEEP W.B.T.	-5	-4	-4	-4	-4	-4	-4	—	—
NO.2 F. W.B.T. (P OR S)	-25	-25	-25	-26	-27	-24	-25	—	—
NO.2 A. W.B.T. (P OR S)	-31	-33	-34	-29	-31	-32	-33	—	—
NO.4 F.WING W.B.T. (P OR S)	-23	-23	-23	-23	-23	-23	—	—	—
NO.4 A.WING W.B.T. (P OR S)	-32	-32	-32	-32	-32	-32	—	—	—
NO.5 WING W.B.T. (P OR S)	-31	-31	-31	-31	-31	-31	—	—	—
NO.6 WING W.B.T. (P OR S)	+14	+25	+26	+27	+29	—	—	—	—
ANTI-HEELING T. (P OR S)	-32	-31	-31	-31	-31	-31	—	—	—

T A N K	SOUNDING DEPTH (M) 1.0	2.0	3.0	4.0	5.0	6.0	—	—	—
NO.1 BTM. W.B.T.	-50	-50	-50	-50	-66	-68	—	—	—
AFT PEAK TANK (P OR S)	-5	+1	+9	+16	+26	—	—	—	—

T A N K	SOUNDING DEPTH (M) 0.5	1.0	1.5	—	—	—	—	—	—
NO.3 BTM. W.B.T. (P OR S)	-51	-54	-55	—	—	—	—	—	—
NO.4 BTM. W.B.T. (P OR S)	-58	-59	-59	—	—	—	—	—	—
NO.5 BTM. W.B.T. (P OR S)	-71	-68	-67	—	—	—	—	—	—

TANK	SOUNDING DEPTH (M) 2.0	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0
NO.3 F.WING F.O.T. (P OR S)	-21	-21	-20	-19	-19	-19	-19	-	-
NO.3 A.WING F.O.T. (P OR S)	-31	-32	-32	-32	-32	-32	-32	-	-
DEEP F.O.T. (P)	+5	+7	+10	+18	+18	+12	+12	+20	+20
DEEP F.O.T. (S)	+4	+8	+12	+20	+29	+28	+27	+27	+27

TANK	SOUNDING DEPTH (M) 0.5	1.0	1.5	2.0	-	-	-	-	-
DIESEL OIL T. (P)	+14	+15	+17	+17	-	-	-	-	-
DIESEL OIL T. (S)	+21	+27	+30	+32	-	-	-	-	-

DEEP W.B.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.1)	0.	4.00	53.2	55.
0.05	0.3	0.	4.05	54.2	56.
0.10	0.5	0.	4.10	55.2	57.
0.15	0.7	1.	4.15	56.1	58.
0.20	0.9	1.	4.20	57.1	59.
0.25	1.2	1.	4.25	58.1	60.
0.30	1.5	2.	4.30	59.1	61.
0.35	1.8	2.	4.35	60.0	62.
0.40	2.1	2.	4.40	61.0	63.
0.45	2.4	2.	4.45	62.0	64.
0.50	2.7	3.	4.50	63.0	65.
0.55	3.1	3.	4.55	64.0	66.
0.60	3.5	4.	4.60	65.0	67.
0.65	3.8	4.	4.65	66.0	68.
0.70	4.2	4.	4.70	67.0	69.
0.75	4.7	5.	4.75	68.0	70.
0.80	5.1	5.	4.80	69.0	71.
0.85	5.5	6.	4.85	70.0	72.
0.90	6.0	6.	4.90	71.0	73.
0.95	6.5	7.	4.95	72.0	74.
1.00	6.9	7.	5.00	73.0	75.
1.05	7.4	8.	5.05	74.0	76.
1.10	8.0	8.	5.10	75.1	77.
1.15	8.5	9.	5.15	76.1	78.
1.20	9.0	9.	5.20	77.1	79.
1.25	9.6	10.	5.25	78.1	80.
1.30	10.1	10.	5.30	79.2	81.
1.35	10.7	11.	5.35	80.2	82.
1.40	11.3	12.	5.40	81.2	83.
1.45	11.9	12.	5.45	82.2	84.
1.50	12.5	13.	5.50	83.3	85.
1.55	13.1	13.	5.55	84.3	86.
1.60	13.7	14.	5.60	85.4	87.
1.65	14.4	15.	5.65	86.4	89.
1.70	15.0	15.	5.70	87.4	90.
1.75	15.7	16.	5.75	88.5	91.
1.80	16.3	17.	5.80	89.5	92.
1.85	17.0	17.	5.85	90.6	93.
1.90	17.7	18.	5.90	91.6	94.
1.95	18.4	19.	5.95	92.7	95.
2.00	19.1	20.	6.00	93.7	96.
2.05	19.8	20.	6.05	94.8	97.
2.10	20.5	21.	6.10	95.8	98.
2.15	21.3	22.	6.15	96.9	99.
2.20	22.0	23.	6.20	97.9	100.
2.25	22.8	23.	6.25	99.0	101.
2.30	23.5	24.	6.30	100.1	103.
2.35	24.3	25.	6.35	101.1	104.
2.40	25.1	26.	6.40	102.2	105.
2.45	25.9	27.	6.45	103.3	106.
2.50	26.6	27.	6.50	104.3	107.
2.55	27.4	28.	6.55	105.4	108.
2.60	28.2	29.	6.60	106.5	109.
2.65	29.1	30.	6.65	107.5	110.
2.70	29.9	31.	6.70	108.6	111.
2.75	30.7	31.	6.75	109.7	112.
2.80	31.5	32.	6.80	110.8	114.
2.85	32.4	33.	6.85	111.9	115.
2.90	33.2	34.	6.90	113.0	116.
2.95	34.1	35.	6.95	114.0	117.
3.00	34.9	36.	7.00	115.1	118.
3.05	35.8	37.	7.05	116.2	119.
3.10	36.7	38.	7.10	117.3	120.
3.15	37.5	38.	7.15	118.4	121.
3.20	38.4	39.	7.20	119.5	123.
3.25	39.3	40.	7.25	120.6	124.
3.30	40.2	41.	7.30	121.7	125.
3.35	41.1	42.	7.35	122.8	126.
3.40	42.0	43.	7.40	123.9	127.
3.45	42.9	44.	7.45	125.1	128.
3.50	43.8	45.	7.50	126.2	129.
3.55	44.7	46.	7.55	127.3	130.
3.60	45.7	47.	7.60	128.4	132.
3.65	46.6	48.	7.65	129.5	133.
3.70	47.5	49.	7.70	130.7	134.
3.75	48.5	50.	7.75	131.8	135.
3.80	49.4	51.	7.80	132.9	136.
3.85	50.4	52.	7.85	134.0	137.
3.90	51.3	53.	7.90	135.2	139.
3.95	52.3	54.	7.95	136.3	140.

DEEP W.B.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	137.4	141.	12.00	244.8	251.
8.05	138.6	142.	12.05	246.6	253.
8.10	139.7	143.	12.10	248.3	254.
8.15	140.9	144.	12.15	250.0	256.
8.20	142.0	146.	12.20	251.7	258.
8.25	143.2	147.	12.25	253.5	260.
8.30	144.3	148.	12.30	255.3	262.
8.35	145.5	149.	12.35	257.1	263.
8.40	146.6	150.	12.40	258.9	265.
8.45	147.8	151.	12.45	260.7	267.
8.50	149.0	153.	12.50	262.5	269.
8.55	150.1	154.	12.55	264.4	271.
8.60	151.3	155.	12.60	266.3	273.
8.65	152.5	156.	12.65	268.1	275.
8.70	153.6	157.	12.70	270.0	277.
8.75	154.8	159.	12.75	271.9	279.
8.80	156.0	160.	12.80	273.9	281.
8.85	157.2	161.	12.85	275.8	283.
8.90	158.4	162.	12.90	277.8	285.
8.95	159.6	164.	12.95	279.8	287.
9.00	160.8	165.	13.00	281.8	289.
9.05	162.0	166.	13.05	283.8	291.
9.10	163.2	167.	13.10	285.9	293.
9.15	164.4	169.	13.15	288.0	295.
9.20	165.6	170.	13.20	290.1	297.
9.25	166.8	171.	13.25	292.2	299.
9.30	168.1	172.	13.30	294.3	302.
9.35	169.3	174.	13.35	296.4	304.
9.40	170.5	175.	13.40	298.6	306.
9.45	171.8	176.	13.45	300.8	308.
9.50	173.0	177.	13.50	303.0	311.
9.55	174.3	179.	13.55	305.3	313.
9.60	175.5	180.	13.60	307.5	315.
9.65	176.8	181.	13.65	309.8	318.
9.70	178.1	183.	13.70	312.1	320.
9.75	179.3	184.	13.75	314.4	322.
9.80	180.6	185.	13.80	316.8	325.
9.85	181.9	186.	13.85	319.1	327.
9.90	183.2	188.	13.90	321.5	330.
9.95	184.5	189.	13.95	324.0	332.
10.00	185.8	190.	14.00	326.4	335.
10.05	187.1	192.	14.05	328.9	337.
10.10	188.4	193.	14.10	331.4	340.
10.15	189.7	194.	14.15	334.0	342.
10.20	191.1	196.	14.20	336.6	345.
10.25	192.4	197.	14.25	339.2	348.
10.30	193.8	199.	14.30	341.8	350.
10.35	195.1	200.	14.35	344.4	353.
10.40	196.5	201.	14.40	347.0	356.
10.45	197.8	203.	14.45	349.6	358.
10.50	199.2	204.	14.50	351.4	360.
10.55	200.6	206.	14.55	352.5	361.
10.60	202.0	207.	14.60	353.5	362.
10.65	203.4	208.	14.65	354.6	363.
10.70	204.8	210.	14.70	355.7	365.
10.75	206.2	211.	14.75	356.8	366.
10.80	207.6	213.	14.80	357.9	367.
10.85	209.0	214.	14.85	359.0	368.
10.90	210.5	216.	14.90	360.1	369.
10.95	211.9	217.	14.95	361.3	370.
11.00	213.4	219.	15.00	362.4	371.
11.05	214.9	220.	15.05	363.6	373.
11.10	216.3	222.	15.10	364.8	374.
11.15	217.8	223.	15.15	366.0	375.
11.20	219.3	225.	15.20	367.2	376.
11.25	220.8	226.	15.25	368.4	378.
11.30	222.3	228.	15.30	369.6	379.
11.35	223.9	229.	15.35	370.8	380.
11.40	225.4	231.	15.40	371.4	381.
11.45	227.0	233.	15.45	371.4	381.
11.50	228.5	234.			
11.55	230.1	236.			
11.60	231.7	237.			
11.65	233.3	239.			
11.70	234.9	241.			
11.75	236.5	242.			
11.80	238.2	244.			
11.85	239.8	246.			
11.90	241.5	248.			
11.95	243.2	249.			

NO.1 BTM.W.B.TK

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.5)	0.	1.60	177.8	182.
0.02	1.1	1.	1.62	181.4	186.
0.04	1.7	2.	1.64	185.0	190.
0.06	2.4	3.	1.66	188.7	193.
0.08	3.2	3.	1.68	192.4	197.
0.10	4.0	4.	1.70	196.1	201.
0.12	4.8	5.	1.72	199.8	205.
0.14	5.7	6.	1.74	203.6	209.
0.16	6.7	7.	1.76	207.4	213.
0.18	7.7	8.	1.78	211.2	217.
0.20	8.7	9.	1.80	215.1	220.
0.22	9.8	10.	1.82	219.0	224.
0.24	10.9	11.	1.84	222.9	228.
0.26	12.1	12.	1.86	226.9	233.
0.28	13.3	14.	1.88	230.8	237.
0.30	14.6	15.	1.90	234.8	241.
0.32	15.9	16.	1.92	238.9	245.
0.34	17.2	18.	1.94	242.9	249.
0.36	18.6	19.	1.96	247.0	253.
0.38	20.1	21.	1.98	251.1	257.
0.40	21.6	22.	2.00	255.3	262.
0.42	23.1	24.	2.02	259.4	266.
0.44	24.7	25.	2.04	263.6	270.
0.46	26.3	27.	2.06	267.9	275.
0.48	27.9	29.	2.08	272.1	279.
0.50	29.6	30.	2.10	276.4	283.
0.52	31.3	32.	2.12	280.7	288.
0.54	33.1	34.	2.14	285.1	292.
0.56	34.9	36.	2.16	289.4	297.
0.58	36.7	38.	2.18	293.8	301.
0.60	38.6	40.	2.20	298.2	306.
0.62	40.6	42.	2.22	302.7	310.
0.64	42.5	44.	2.24	307.1	315.
0.66	44.5	46.	2.26	311.6	319.
0.68	46.6	48.	2.28	316.2	324.
0.70	48.6	50.	2.30	320.7	329.
0.72	50.8	52.	2.32	325.3	333.
0.74	52.9	54.	2.34	329.9	338.
0.76	55.1	56.	2.36	334.5	343.
0.78	57.3	59.	2.38	339.2	348.
0.80	59.6	61.	2.40	343.9	352.
0.82	61.9	63.	2.42	348.6	357.
0.84	64.2	66.	2.44	353.3	362.
0.86	66.6	68.	2.46	358.1	367.
0.88	69.0	71.	2.48	362.8	372.
0.90	71.4	73.	2.50	367.6	377.
0.92	73.9	76.	2.52	372.5	382.
0.94	76.4	78.	2.54	377.3	387.
0.96	79.0	81.	2.56	382.2	392.
0.98	[illegible]	84.	2.58	387.1	397.
1.00	84.2	86.	2.60	392.1	402.
1.02	86.8	89.	2.62	397.0	407.
1.04	89.5	92.	2.64	402.0	412.
1.06	92.2	95.	2.66	407.1	417.
1.08	95.0	97.	2.68	412.1	422.
1.10	97.8	100.	2.70	417.2	428.
1.12	100.6	103.	2.72	422.2	433.
1.14	103.4	106.	2.74	427.4	438.
1.16	106.3	109.	2.76	432.5	443.
1.18	109.2	112.	2.78	437.7	449.
1.20	112.2	115.	2.80	442.9	454.
1.22	115.2	118.	2.82	448.1	459.
1.24	118.2	121.	2.84	453.3	465.
1.26	121.2	124.	2.86	458.6	470.
1.28	124.3	127.	2.88	463.9	475.
1.30	127.4	131.	2.90	469.2	481.
1.32	130.6	134.	2.92	474.5	486.
1.34	133.7	137.	2.94	479.9	492.
1.36	136.9	140.	2.96	485.2	497.
1.38	140.2	144.	2.98	490.7	503.
1.40	143.4	147.	3.00	496.1	508.
1.42	146.7	150.	3.02	501.5	514.
1.44	150.1	154.	3.04	507.0	520.
1.46	153.4	157.	3.06	512.5	525.
1.48	156.8	161.	3.08	518.1	531.
1.50	160.2	164.	3.10	523.6	537.
1.52	163.7	168.	3.12	529.2	542.
1.54	167.2	171.	3.14	534.8	548.
1.56	170.7	175.	3.16	540.4	554.
1.58	174.2	179.	3.18	546.1	560.

NO.1 BTM.W.B.TK

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
3.20	551.7	566.	4.80	1015.0	1040.
3.22	557.4	571.	4.82	1019.3	1045.
3.24	563.2	577.	4.84	1023.6	1049.
3.26	568.9	583.	4.86	1028.0	1054.
3.28	574.7	589.	4.88	1032.3	1058.
3.30	580.5	595.	4.90	1036.6	1063.
3.32	586.3	601.	4.92	1041.0	1067.
3.34	592.1	607.	4.94	1045.3	1071.
3.36	598.0	613.	4.96	1049.7	1076.
3.38	603.9	619.	4.98	1054.1	1080.
3.40	609.8	625.	5.00	1058.4	1085.
3.42	615.9	631.	5.02	1062.8	1089.
3.44	621.9	637.	5.04	1067.2	1094.
3.46	627.9	644.	5.06	1071.6	1098.
3.48	633.9	650.	5.08	1076.0	1103.
3.50	639.9	656.	5.10	1080.5	1107.
3.52	645.9	662.	5.12	1084.9	1112.
3.54	652.0	668.	5.14	1089.3	1117.
3.56	658.0	674.	5.16	1093.8	1121.
3.58	664.0	681.	5.18	1098.2	1126.
3.60	670.1	687.	5.20	1102.7	1130.
3.62	676.2	693.	5.22	1107.1	1135.
3.64	682.4	699.	5.24	1111.6	1139.
3.66	688.6	706.	5.26	1116.1	1144.
3.68	694.8	712.	5.28	1120.6	1149.
3.70	701.0	719.	5.30	1125.1	1153.
3.72	707.2	725.	5.32	1129.6	1158.
3.74	713.5	731.	5.34	1134.1	1162.
3.76	719.8	738.	5.36	1138.6	1167.
3.78	726.1	744.	5.38	1143.1	1172.
3.80	732.4	751.	5.40	1147.7	1176.
3.82	738.8	757.	5.42	1152.2	1181.
3.84	745.2	764.	5.44	1156.8	1186.
3.86	751.6	770.	5.46	1161.3	1190.
3.88	758.0	777.	5.48	1165.9	1195.
3.90	764.5	784.	5.50	1170.5	1200.
3.92	770.9	790.	5.52	1175.0	1204.
3.94	777.4	797.	5.54	1179.6	1209.
3.96	784.0	804.	5.56	1184.2	1214.
3.98	790.5	810.	5.58	1188.8	1219.
4.00	797.1	817.	5.60	1193.4	1223.
4.02	803.6	824.	5.62	1198.1	1228.
4.04	810.2	831.	5.64	1202.7	1233.
4.06	816.9	837.	5.66	1207.3	1237.
4.08	823.5	844.	5.68	1212.0	1242.
4.10	830.2	851.	5.70	1216.6	1247.
4.12	836.9	858.	5.72	1221.3	1252.
4.14	843.6	865.	5.74	1225.9	1257.
4.16	850.3	872.	5.76	1230.6	1261.
4.18	857.1	879.	5.78	1235.3	1266.
4.20	864.0	886.	5.80	1239.9	1271.
4.22	870.8	893.	5.82	1244.6	1276.
4.24	877.7	900.	5.84	1249.3	1281.
4.26	884.6	907.	5.86	1254.0	1285.
4.28	891.5	914.	5.88	1258.7	[illegible]
4.30	898.4	921.	5.90	1263.5	1295.
4.32	905.3	928.	5.92	1268.2	1300.
4.34	912.1	935.	5.94	1272.9	1305.
4.36	919.0	942.	5.96	1277.7	1310.
4.38	925.9	949.	5.98	1282.4	1314.
4.40	930.6	954.	6.00	1287.2	1319.
4.42	934.7	958.	6.02	1291.9	1324.
4.44	938.9	962.	6.04	1296.7	1329.
4.46	943.0	967.	6.06	1301.5	1334.
4.48	947.2	971.	6.08	1306.3	1339.
4.50	951.4	975.	6.10	1311.0	1344.
4.52	955.6	979.	6.12	1315.8	1349.
4.54	959.8	984.	6.14	1320.6	1354.
4.56	964.0	988.	6.16	1325.5	1359.
4.58	968.2	992.	6.18	1330.3	1364.
4.60	972.4	997.	6.20	1335.1	1368.
4.62	976.6	1001.	6.22	1339.9	1373.
4.64	980.8	1005.	6.24	1344.8	1378.
4.66	985.1	1010.	6.26	1349.6	1383.
4.68	989.3	1014.	6.28	1354.5	1388.
4.70	993.6	1018.	6.30	1359.3	1393.
4.72	997.9	1023.	6.32	1364.2	1398.
4.74	1002.1	1027.	6.34	1369.1	1403.
4.76	1006.4	1032.	6.36	1373.9	1408.
4.78	1010.7	1036.	6.38	1378.8	1413.

NO.1 BTM.W.B.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
6.40	1383.7	1418.
6.42	1388.6	1423.
6.44	1393.5	1428.
6.46	1398.4	1433.
6.48	1403.4	1438.
6.50	1408.3	1444.
6.52	1413.2	1449.
6.54	1418.2	1454.
6.56	1423.1	1459.
6.58	1428.1	1464.
6.60	1433.0	1469.
6.62	1438.0	1474.
6.64	1443.0	1479.
6.66	1448.0	1484.
6.68	1453.0	1489.
6.70	1457.9	1494.
6.72	1463.0	1500.
6.74	1468.0	1505.
6.76	1473.0	1510.
6.78	1478.0	1515.
6.80	1483.0	1520.
6.82	1488.1	1525.
6.84	1493.2	1530.
6.86	1498.2	1536.
6.88	1503.3	1541.
6.90	1508.3	1546.
6.92	1513.4	1551.
6.94	1518.5	1556.
6.96	1523.5	1562.
6.98	1527.1	1565.
7.00	1527.1	1565.

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NO.2 F.W.B.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.2)	0.	0.80	26.9	28.
0.01	0.4	0.	0.81	27.4	28.
0.02	0.5	1.	0.82	27.9	29.
0.03	0.7	1.	0.83	28.5	29.
0.04	0.9	1.	0.84	29.0	30.
0.05	1.0	1.	0.85	29.5	30.
0.06	1.2	1.	0.86	30.0	31.
0.07	1.4	1.	0.87	30.5	31.
0.08	1.6	2.	0.88	31.1	32.
0.09	1.8	2.	0.89	31.6	32.
0.10	2.0	2.	0.90	32.1	33.
0.11	2.2	2.	0.91	32.7	33.
0.12	2.4	2.	0.92	33.2	34.
0.13	2.6	3.	0.93	33.7	35.
0.14	2.8	3.	0.94	34.3	35.
0.15	3.0	3.	0.95	34.8	36.
0.16	3.2	3.	0.96	35.4	36.
0.17	3.4	4.	0.97	36.0	37.
0.18	3.7	4.	0.98	36.5	37.
0.19	3.9	4.	0.99	37.1	38.
0.20	4.1	4.	1.00	37.7	39.
0.21	4.4	5.	1.01	38.3	39.
0.22	4.6	5.	1.02	38.8	40.
0.23	4.9	5.	1.03	39.4	40.
0.24	5.1	5.	1.04	40.0	41.
0.25	5.4	6.	1.05	40.6	42.
0.26	5.7	6.	1.06	41.2	42.
0.27	5.9	6.	1.07	41.8	43.
0.28	6.2	6.	1.08	42.4	43.
0.29	6.5	7.	1.09	43.0	44.
0.30	6.8	7.	1.10	43.6	45.
0.31	7.1	7.	1.11	44.3	45.
0.32	7.4	8.	1.12	44.9	46.
0.33	7.7	8.	1.13	45.5	47.
0.34	8.0	8.	1.14	46.1	47.
0.35	8.3	8.	1.15	46.7	48.
0.36	8.6	9.	1.16	47.4	49.
0.37	8.9	9.	1.17	48.0	49.
0.38	9.2	9.	1.18	48.6	50.
0.39	9.5	10.	1.19	49.3	51.
0.40	9.9	10.	1.20	49.9	51.
0.41	10.2	10.	1.21	50.6	52.
0.42	10.5	11.	1.22	51.2	52.
0.43	10.9	11.	1.23	51.8	53.
0.44	11.2	11.	1.24	52.5	54.
0.45	11.6	12.	1.25	53.2	54.
0.46	11.9	12.	1.26	53.8	55.
0.47	12.3	13.	1.27	54.5	56.
0.48	12.6	13.	1.28	55.1	57.
0.49	13.0	13.	1.29	55.8	57.
0.50	13.4	14.	1.30	56.5	58.
0.51	13.8	14.	1.31	57.1	59.
0.52	14.2	15.	1.32	57.8	59.
0.53	14.6	15.	1.33	58.5	60.
0.54	15.0	15.	1.34	59.2	61.
0.55	15.5	16.	1.35	59.9	61.
0.56	15.9	16.	1.36	60.5	62.
0.57	16.3	17.	1.37	61.2	63.
0.58	16.7	17.	1.38	61.9	63.
0.59	17.1	18.	1.39	62.6	64.
0.60	17.6	18.	1.40	63.3	65.
0.61	18.0	18.	1.41	64.0	66.
0.62	18.5	19.	1.42	64.7	66.
0.63	18.9	19.	1.43	65.4	67.
0.64	19.3	20.	1.44	66.1	68.
0.65	19.8	20.	1.45	66.8	69.
0.66	20.2	21.	1.46	67.6	69.
0.67	20.7	21.	1.47	68.3	70.
0.68	21.2	22.	1.48	69.0	71.
0.69	21.6	22.	1.49	69.7	71.
0.70	22.1	23.	1.50	70.5	72.
0.71	22.6	23.	1.51	71.3	73.
0.72	23.0	24.	1.52	72.0	74.
0.73	23.5	24.	1.53	72.8	75.
0.74	24.0	25.	1.54	73.6	75.
0.75	24.5	25.	1.55	74.3	76.
0.76	25.0	26.	1.56	75.1	77.
0.77	25.4	26.	1.57	75.9	78.
0.78	25.9	27.	1.58	76.6	79.
0.79	26.4	27.	1.59	77.4	79.

NO.2 F.W.B.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
1.60	78.2	80.	4.00	161.3	165.
1.61	78.9	81.	4.05	163.2	167.
1.62	79.7	82.	4.10	165.1	169.
1.63	80.5	82.	4.15	167.0	171.
1.64	81.2	83.	4.20	168.9	173.
1.65	82.0	84.	4.25	170.9	175.
1.66	82.8	85.	4.30	172.9	177.
1.67	83.5	86.	4.35	174.9	179.
1.68	84.3	86.	4.40	176.9	181.
1.69	85.1	87.	4.45	178.9	183.
1.70	85.8	88.	4.50	180.9	185.
1.71	86.6	89.	4.55	183.0	188.
1.72	87.4	90.	4.60	185.0	190.
1.73	88.1	90.	4.65	187.1	192.
1.74	88.9	91.	4.70	189.1	194.
1.75	89.7	92.	4.75	191.2	196.
1.76	90.4	93.	4.80	193.2	198.
1.77	91.2	93.	4.85	195.3	200.
1.78	91.6	94.	4.90	197.4	202.
1.79	91.9	94.	4.95	199.4	204.
1.80	92.1	94.	5.00	201.5	207.
1.81	92.3	95.	5.05	203.6	209.
1.82	92.5	95.	5.10	205.7	211.
1.83	92.8	95.	5.15	207.8	213.
1.84	93.0	95.	5.20	209.9	215.
1.85	93.2	96.	5.25	212.0	217.
1.86	93.5	96.	5.30	214.1	219.
1.87	93.7	96.	5.35	216.2	222.
1.88	93.9	96.	5.40	218.3	224.
1.89	94.2	97.	5.45	220.4	226.
1.90	94.4	97.	5.50	222.5	228.
1.91	94.6	97.	5.55	224.6	230.
1.92	94.9	97	5.60	226.7	232.
1.93	95.1	97.	5.65	228.8	235.
1.94	95.3	98.	5.70	230.9	237.
1.95	95.6	98.	5.75	233.0	239.
1.96	95.8	98.	5.80	235.1	241.
1.97	96.1	98.	5.85	237.2	243.
1.98	96.3	99.	5.90	239.3	245.
1.99	96.6	99.	5.95	241.4	247.
2.00	96.8	99.	6.00	243.5	250.
2.05	98.1	101.	6.05	245.6	252.
2.10	99.4	102.	6.10	247.7	254.
2.15	100.7	103.	6.15	249.8	256.
2.20	102.0	105.	6.20	251.9	258.
2.25	103.4	106.	6.25	254.0	260.
2.30	104.8	107.	6.30	256.1	263.
2.35	106.1	109.	6.35	258.2	265.
2.40	107.5	110.	6.40	260.3	267.
2.45	108.9	112.	6.45	262.4	269.
2.50	110.4	113.	6.50	264.5	271.
2.55	111.8	115.	6.55	266.5	273.
2.60	113.3	116.	6.60	268.6	275.
2.65	114.8	118.	6.65	270.7	277.
2.70	116.3	119.	6.70	272.8	280.
2.75	117.9	121.	6.75	274.8	282.
2.80	119.4	122.	6.80	276.9	284.
2.85	121.0	124.	6.85	278.9	286.
2.90	122.6	126.	6.90	281.0	288.
2.95	124.2	127.	6.95	283.0	290.
3.00	125.8	129.	7.00	285.0	292.
3.05	127.5	131.	7.05	287.1	294.
3.10	129.1	132.	7.10	289.1	296.
3.15	130.8	134.	7.15	291.1	298.
3.20	132.5	136.	7.20	293.1	300.
3.25	134.2	138.	7.25	295.2	303.
3.30	135.9	139.	7.30	297.2	305.
3.35	137.7	141.	7.35	299.2	307.
3.40	139.4	143.	7.40	301.1	309.
3.45	141.2	145.	7.45	303.1	311.
3.50	142.9	147.	7.50	305.1	313.
3.55	144.7	148.	7.55	307.1	315.
3.60	146.5	150.	7.60	309.0	317.
3.65	148.3	152.	7.65	311.0	319.
3.70	150.2	154.	7.70	312.9	321.
3.75	152.0	156.	7.75	314.9	323.
3.80	153.8	158.	7.80	316.8	325.
3.85	155.7	160.	7.85	318.7	327.
3.90	157.5	161.	7.90	320.6	329.
3.95	159.4	163.	7.95	322.5	331.

NO.2 F.W.B.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	324.4	333.	12.00	443.6	455.
8.05	326.3	334.	12.05	445.0	456.
8.10	328.2	336.	12.10	446.4	458.
8.15	330.0	338.	12.15	447.9	459.
8.20	331.9	340.	12.20	449.3	461.
8.25	333.7	342.	12.25	450.7	462.
8.30	335.6	344.	12.30	452.2	463.
8.35	337.4	346.	12.35	453.6	465.
8.40	339.2	348.	12.40	455.1	466.
8.45	341.0	350.	12.45	456.6	468.
8.50	342.8	351.	12.50	458.0	469.
8.55	344.6	353.	12.55	459.5	471.
8.60	346.3	355.	12.60	461.0	473.
8.65	348.1	357.	12.65	462.5	474.
8.70	349.8	359.	12.70	464.1	476.
8.75	351.6	360.	12.75	465.6	477.
8.80	353.3	362.	12.80	467.1	479.
8.85	355.0	364.	12.85	468.7	480.
8.90	356.7	366.	12.90	470.2	482.
8.95	358.4	367.	12.95	471.8	484.
9.00	360.1	369.	13.00	473.3	485.
9.05	361.7	371.	13.05	474.9	487.
9.10	363.4	372.	13.10	476.5	488.
9.15	365.0	374.	13.15	478.0	490.
9.20	366.6	376.	13.20	479.6	492.
9.25	368.2	377.	13.25	481.2	493.
9.30	369.8	379.	13.30	482.8	495.
9.35	371.4	381.	13.35	484.4	497.
9.40	373.0	382.	13.40	486.0	498.
9.45	374.5	384.	13.45	487.6	500.
9.50	376.0	385.	13.50	489.3	501.
9.55	377.5	387.	13.55	490.9	503.
9.60	379.0	389.	13.60	492.5	505.
9.65	380.5	390.	13.65	494.2	507.
9.70	382.0	392.	13.70	495.8	508.
9.75	383.4	393.	13.75	497.5	510.
9.80	384.9	395.	13.80	499.1	512.
9.85	386.3	396.	13.85	500.8	513.
9.90	387.8	397.	13.90	502.4	515.
9.95	389.2	399.	13.95	504.1	517.
10.00	390.6	400.	14.00	505.7	518.
10.05	392.0	402.	14.05	507.4	520.
10.10	393.3	403.	14.10	509.1	522.
10.15	394.7	405.	14.15	510.8	524.
10.20	396.1	406.	14.20	512.5	525.
10.25	397.4	407.	14.25	514.2	527.
10.30	398.8	409.	14.30	515.8	529.
10.35	400.1	410.	14.35	517.5	530.
10.40	401.4	411.	14.40	519.1	532.
10.45	402.8	413.	14.45	520.8	534.
10.50	404.1	414.	14.50	522.5	536.
10.55	405.4	416.	14.55	524.1	537.
10.60	406.7	417.	14.60	525.8	539.
10.65	408.0	418.	14.65	527.5	541.
10.70	409.3	420.	14.70	529.1	542.
10.75	410.6	421.	14.75	530.8	544.
10.80	411.9	422.	14.80	532.5	546.
10.85	413.2	424.	14.85	534.2	548.
10.90	414.5	425.	14.90	535.8	549.
10.95	415.8	426.	14.95	537.5	551.
11.00	417.1	427.	15.00	539.2	553.
11.05	418.4	429.	15.05	540.9	554.
11.10	419.6	430.	15.10	542.6	556.
11.15	420.9	431.	15.15	544.3	558.
11.20	422.2	433.	15.20	546.0	560.
11.25	423.5	434.	15.25	547.7	561.
11.30	424.8	435.	15.30	549.4	563.
11.35	426.1	437.	15.35	551.0	565.
11.40	427.4	438.	15.40	552.0	566.
11.45	428.7	439.	15.45	552.0	566.
11.50	430.1	441.			
11.55	431.4	442.			
11.60	432.7	444.			
11.65	434.1	445.			
11.70	435.4	446.			
11.75	436.8	448.			
11.80	438.1	449.			
11.85	439.5	450.			
11.90	440.8	452.			
11.95	442.2	453.			

NO.2 F.W.B.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.2)	0.	0.80	26.9	28.
0.01	0.4	0.	0.81	27.4	28.
0.02	0.5	1.	0.82	27.9	29.
0.03	0.7	1.	0.83	28.5	29.
0.04	0.9	1.	0.84	29.0	30.
0.05	1.0	1.	0.85	29.5	30.
0.06	1.2	1.	0.86	30.0	31.
0.07	1.4	1.	0.87	30.5	31.
0.08	1.6	2.	0.88	31.1	32.
0.09	1.8	2.	0.89	31.6	32.
0.10	2.0	2.	0.90	32.1	33.
0.11	2.2	2.	0.91	32.7	33.
0.12	2.4	2.	0.92	33.2	34.
0.13	2.6	3.	0.93	33.7	35.
0.14	2.8	3.	0.94	34.3	35.
0.15	3.0	3.	0.95	34.8	36.
0.16	3.2	3.	0.96	35.4	36.
0.17	3.4	4.	0.97	36.0	37.
0.18	3.7	4.	0.98	36.5	37.
0.19	3.9	4.	0.99	37.1	38.
0.20	4.1	4.	1.00	37.7	39.
0.21	4.4	5.	1.01	38.3	39.
0.22	4.6	5.	1.02	38.8	40.
0.23	4.9	5.	1.03	39.4	40.
0.24	5.1	5.	1.04	40.0	41.
0.25	5.4	6.	1.05	40.6	42.
0.26	5.7	6.	1.06	41.2	42.
0.27	5.9	6.	1.07	41.8	43.
0.28	6.2	6.	1.08	42.4	43.
0.29	6.5	7.	1.09	43.0	44.
0.30	6.8	7.	1.10	43.6	45.
0.31	7.1	7.	1.11	44.3	45.
0.32	7.4	8.	1.12	44.9	46.
0.33	7.7	8.	1.13	45.5	47.
0.34	8.0	8.	1.14	46.1	47.
0.35	8.3	8.	1.15	46.7	48.
0.36	8.6	9.	1.16	47.4	49.
0.37	8.9	9.	1.17	48.0	49.
0.38	9.2	9.	1.18	48.6	50.
0.39	9.5	10.	1.19	49.3	51.
0.40	9.9	10.	1.20	49.9	51.
0.41	10.2	10.	1.21	50.6	52.
0.42	10.5	11.	1.22	51.2	52.
0.43	10.9	11.	1.23	51.8	53.
0.44	11.2	11.	1.24	52.5	54.
0.45	11.6	12.	1.25	53.2	54.
0.46	11.9	12.	1.26	53.8	55.
0.47	12.3	13.	1.27	54.5	56.
0.48	12.6	13.	1.28	55.1	57.
0.49	13.0	13.	1.29	55.8	57.
0.50	13.4	14.	1.30	56.5	58.
0.51	13.8	14.	1.31	57.1	59.
0.52	14.2	15.	1.32	57.8	59.
0.53	14.6	15.	1.33	58.5	60.
0.54	15.0	15.	1.34	59.2	61.
0.55	15.5	16.	1.35	59.9	61.
0.56	15.9	16.	1.36	60.5	62.
0.57	16.3	17.	1.37	61.2	63.
0.58	16.7	17.	1.38	61.9	63.
0.59	17.1	18.	1.39	62.6	64.
0.60	17.6	18.	1.40	63.3	65.
0.61	18.0	18.	1.41	64.0	66.
0.62	18.5	19.	1.42	64.7	66.
0.63	18.9	19.	1.43	65.4	67.
0.64	19.3	20.	1.44	66.1	68.
0.65	19.8	20.	1.45	66.8	69.
0.66	20.2	21.	1.46	67.6	69.
0.67	20.7	21.	1.47	68.3	70.
0.68	21.2	22.	1.48	69.0	71.
0.69	21.6	22.	1.49	69.7	71.
0.70	22.1	23.	1.50	70.5	72.
0.71	22.6	23.	1.51	71.3	73.
0.72	23.0	24.	1.52	72.0	74.
0.73	23.5	24.	1.53	72.8	75.
0.74	24.0	25.	1.54	73.6	75.
0.75	24.5	25.	1.55	74.3	76.
0.76	25.0	26.	1.56	75.1	77.
0.77	25.4	26.	1.57	75.9	78.
0.78	25.9	27.	1.58	76.6	79.
0.79	26.4	27.	1.59	77.4	79.

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NO.2 F.W.B.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
1.60	78.2	80.	4.00	163.6	168.
1.61	78.9	81.	4.05	165.6	170.
1.62	79.7	82.	4.10	167.6	172.
1.63	80.5	82.	4.15	169.6	174.
1.64	81.2	83.	4.20	171.5	176.
1.65	82.0	84.	4.25	173.6	178.
1.66	82.8	85.	4.30	175.6	180.
1.67	83.5	86.	4.35	177.6	182.
1.68	84.3	86.	4.40	179.6	184.
1.69	85.1	87.	4.45	181.6	186.
1.70	85.8	88.	4.50	183.7	188.
1.71	86.6	89.	4.55	185.7	190.
1.72	87.4	90.	4.60	187.8	192.
1.73	88.1	90.	4.65	189.8	195.
1.74	88.9	[illegible]	4.70	191.9	197.
1.75	89.7	92.	4.75	193.9	199.
1.76	90.4	93.	4.80	196.0	201.
1.77	91.2	93.	4.85	198.1	203.
1.78	91.6	94.	4.90	200.2	205.
1.79	91.9	94.	4.95	202.2	207.
1.80	92.1	94.	5.00	204.3	209.
1.81	92.3	95.	5.05	206.4	212.
1.82	92.5	95.	5.10	208.5	214.
1.83	92.8	95.	5.15	210.6	216.
1.84	93.0	95.	5.20	212.7	218.
1.85	93.2	96.	5.25	214.8	220.
1.86	93.5	96.	5.30	216.9	222.
1.87	93.7	96.	5.35	219.0	224.
1.88	93.9	96.	5.40	221.1	227.
1.89	94.2	97.	5.45	223.2	229.
1.90	94.4	97.	5.50	225.3	231.
1.91	94.6	97.	5.55	227.4	233.
1.92	94.9	97.	5.60	229.5	235.
1.93	95.1	97.	5.65	231.6	237.
1.94	95.3	98.	5.70	233.7	240.
1.95	95.6	98.	5.75	235.8	242.
1.96	95.8	98.	5.80	237.9	244.
1.97	96.1	98.	5.85	240.0	246.
1.98	96.3	99.	5.90	242.1	248.
1.99	96.6	99.	5.95	244.2	250.
2.00	96.8	99.	6.00	246.3	252.
2.05	98.1	101.	6.05	248.4	255.
2.10	99.4	102.	6.10	250.5	257.
2.15	100.7	103.	6.15	252.6	259.
2.20	102.0	105.	6.20	254.7	261.
2.25	103.4	106.	6.25	256.8	263.
2.30	104.8	107.	6.30	258.9	265.
2.35	106.2	109.	6.35	261.0	268.
2.40	107.6	110.	6.40	263.1	270.
2.45	109.1	112.	6.45	265.2	272.
2.50	110.6	113.	6.50	267.2	274.
2.55	112.1	115.	6.55	269.3	276.
2.60	113.7	117.	6.60	271.4	278.
2.65	115.2	118.	6.65	273.5	280.
2.70	116.8	120.	6.70	275.5	282.
2.75	118.4	121.	6.75	277.6	285.
2.80	120.0	123.	6.80	279.6	287.
2.85	121.6	125.	6.85	281.7	289.
2.90	123.3	126.	6.90	283.7	291.
2.95	125.0	128.	6.95	285.7	293.
3.00	126.7	130.	7.00	287.8	295.
3.05	128.4	132.	7.05	289.8	297.
3.10	130.1	133.	7.10	291.8	299.
3.15	131.9	135.	7.15	293.8	301.
3.20	133.6	137.	7.20	295.8	303.
3.25	135.4	139.	7.25	297.8	305.
3.30	137.2	141.	7.30	299.8	307.
3.35	139.0	142.	7.35	301.8	309.
3.40	140.8	144.	7.40	303.8	311.
3.45	142.6	146.	7.45	305.8	313.
3.50	144.5	148.	7.50	307.7	315.
3.55	146.3	150.	7.55	309.7	317.
3.60	148.2	152.	7.60	311.6	319.
3.65	150.1	154.	7.65	313.6	321.
3.70	152.0	156.	7.70	315.5	323.
3.75	153.9	158.	7.75	317.4	325.
3.80	155.8	160.	7.80	319.4	327.
3.85	157.8	162.	7.85	321.3	329.
3.90	159.7	164.	7.90	323.2	331.
3.95	161.6	166.	7.95	325.0	333.

NO.2 F.W.B.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	326.9	335.	12.00	445.2	456.
8.05	328.8	337.	12.05	446.6	458.
8.10	330.7	339.	12.10	448.0	459.
8.15	332.5	341.	12.15	449.4	461.
8.20	334.3	343.	12.20	450.9	462.
8.25	336.2	345.	12.25	452.3	464.
8.30	338.0	346.	12.30	453.8	465.
8.35	339.8	348.	12.35	455.2	467.
8.40	341.6	350.	12.40	456.7	468.
8.45	343.4	352.	12.45	458.2	470.
8.50	345.2	354.	12.50	459.6	471.
8.55	346.9	356.	12.55	461.1	473.
8.60	348.7	357.	12.60	462.6	474.
8.65	350.4	359.	12.65	464.2	476.
8.70	352.2	361.	12.70	465.7	477.
8.75	353.9	363.	12.75	467.2	479.
8.80	355.6	364.	12.80	468.7	480.
8.85	357.3	366.	12.85	470.3	482.
8.90	359.0	368.	12.90	471.8	484.
8.95	360.6	370.	12.95	473.4	485.
9.00	362.3	371.	13.00	474.9	487.
9.05	363.9	373.	13.05	476.5	488.
9.10	365.6	375.	13.10	478.1	490.
9.15	367.2	376.	13.15	479.7	492.
9.20	368.8	378.	13.20	481.3	493.
9.25	370.4	380.	13.25	482.9	495.
9.30	371.9	381.	13.30	484.5	497.
9.35	373.5	383.	13.35	486.1	498.
9.40	375.0	384.	13.40	487.7	500.
9.45	376.5	386.	13.45	489.3	502.
9.50	378.1	388.	13.50	491.0	503.
9.55	379.5	389.	13.55	492.6	505.
9.60	381.0	391.	13.60	494.2	507.
9.65	382.5	392.	13.65	495.9	508.
9.70	383.9	394.	13.70	497.5	510.
9.75	385.4	395.	13.75	499.2	512.
9.80	386.8	396.	13.80	500.8	513.
9.85	388.2	398.	13.85	502.5	515.
9.90	389.6	399.	13.90	504.1	517.
9.95	391.0	401.	13.95	505.8	518.
10.00	392.4	402.	14.00	507.5	520.
10.05	393.8	404.	14.05	509.2	522.
10.10	395.1	405.	14.10	510.8	524.
10.15	396.5	406.	14.15	512.5	525.
10.20	397.8	408.	14.20	514.2	527.
10.25	399.1	409.	14.25	515.9	529.
10.30	400.5	410.	14.30	517.6	531.
10.35	401.8	412.	14.35	519.3	532.
10.40	403.1	413.	14.40	521.0	534.
10.45	404.4	415.	14.45	522.7	536.
10.50	405.8	416.	14.50	524.3	537.
10.55	407.0	417.	14.55	526.0	539.
10.60	408.3	419.	14.60	527.7	541.
10.65	409.6	420.	14.65	529.4	543.
10.70	[illegible]	421.	14.70	531.1	544.
10.75	412.2	423.	14.75	532.8	546.
10.80	413.5	424.	14.80	534.5	548.
10.85	414.8	425.	14.85	536.1	550.
10.90	416.1	426.	14.90	537.8	551.
10.95	417.4	428.	14.95	539.5	553.
11.00	418.7	429.	15.00	541.2	555.
11.05	419.9	430.	15.05	542.9	557.
11.10	421.2	432.	15.10	544.6	558.
11.15	422.5	433.	15.15	546.4	560.
11.20	423.8	434.	15.20	548.1	562.
11.25	425.1	436.	15.25	549.8	564.
11.30	426.4	437.	15.30	551.5	565.
11.35	427.7	438.	15.35	552.0	566.
11.40	429.0	440.	15.40	552.0	566.
11.45	430.3	441.	15.45	552.0	566.
11.50	431.6	442.			
11.55	433.0	444.			
11.60	434.3	445.			
11.65	435.7	447.			
11.70	437.0	448.			
11.75	438.3	449.			
11.80	439.7	451.			
11.85	441.0	452.			
11.90	442.4	453.			
11.95	443.8	455.			

TS1323

NO.2 A.W.B.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.8)	0 (1.)	0.80	64.4	66.
0.01	1.3	1.	0.81	65.4	67.
0.02	1.8	2.	0.82	66.4	68.
0.03	2.3	2.	0.83	67.4	69.
0.04	2.8	3.	0.84	68.4	70.
0.05	3.3	3.	0.85	69.4	71.
0.06	3.8	4.	0.86	70.4	72.
0.07	4.4	4.	0.87	71.4	73.
0.08	4.9	5.	0.88	72.3	74.
0.09	5.5	6.	0.89	73.3	75.
0.10	6.0	6.	0.90	74.3	76.
0.11	6.6	7.	0.91	75.4	77.
0.12	7.2	7.	0.92	76.5	78.
0.13	7.8	8.	0.93	77.6	80.
0.14	8.4	9.	0.94	78.7	81.
0.15	8.9	9.	0.95	79.9	82.
0.16	9.6	10.	0.96	81.0	83.
0.17	10.2	10.	0.97	82.1	84.
0.18	10.8	11.	0.98	83.2	85.
0.19	11.4	12.	0.99	84.3	86.
0.20	12.0	12.	1.00	85.5	88.
0.21	12.7	13.	1.01	86.6	89.
0.22	13.3	14.	1.02	87.8	90.
0.23	14.0	14.	1.03	89.0	91.
0.24	14.6	15.	1.04	90.1	92.
0.25	15.3	16.	1.05	91.3	94.
0.26	16.0	16.	1.06	92.5	95.
0.27	16.7	17.	1.07	93.6	96.
0.28	17.3	18.	1.08	94.8	97.
0.29	18.0	18.	1.09	96.0	98.
0.30	18.8	19.	1.10	97.2	100.
0.31	19.5	20.	1.11	98.4	101.
0.32	20.2	21.	1.12	99.6	102.
0.33	20.9	21.	1.13	100.8	103.
0.34	21.6	22.	1.14	102.0	105.
0.35	22.4	23.	1.15	103.2	106.
0.36	23.1	24.	1.16	104.4	107.
0.37	23.9	24.	1.17	105.6	108.
0.38	24.6	25.	1.18	106.8	109.
0.39	25.4	26.	1.19	108.0	111.
0.40	26.2	27.	1.20	109.3	112.
0.41	27.0	28.	1.21	110.5	113.
0.42	27.8	28.	1.22	111.7	115.
0.43	28.6	29.	1.23	113.0	116.
0.44	29.4	30.	1.24	114.2	117.
0.45	30.2	31.	1.25	115.5	118.
0.46	31.0	32.	1.26	116.7	120.
0.47	31.8	33.	1.27	118.0	121.
0.48	32.7	33.	1.28	119.2	122.
0.49	33.6	34.	1.29	120.5	124.
0.50	34.6	35.	1.30	121.8	125.
0.51	35.6	36.	1.31	123.0	126.
0.52	36.6	37.	1.32	124.3	127.
0.53	37.6	39.	1.33	125.6	129.
0.54	38.6	40.	1.34	126.9	130.
0.55	39.6	41.	1.35	128.2	131.
0.56	40.6	42.	1.36	129.4	133.
0.57	41.5	43.	1.37	130.7	134.
0.58	42.5	44.	1.38	132.0	135.
0.59	43.5	45.	1.39	133.3	137.
0.60	44.5	46.	1.40	134.7	38.
0.61	45.5	47.	1.41	136.0	139.
0.62	46.5	48.	1.42	137.3	141.
0.63	47.5	49.	1.43	138.6	142.
0.64	48.5	50.	1.44	139.9	143.
0.65	49.5	51.	1.45	141.2	145.
0.66	50.5	52.	1.46	142.6	146.
0.67	51.5	53.	1.47	143.9	148.
0.68	52.5	54.	1.48	145.2	149.
0.69	53.5	55.	1.49	146.6	150.
0.70	54.5	56.	1.50	148.0	152.
0.71	55.5	57.	1.51	149.4	153.
0.72	56.4	58.	1.52	150.8	155.
0.73	57.4	59.	1.53	152.2	156.
0.74	58.4	60.	1.54	153.6	157.
0.75	59.4	61.	1.55	155.0	159.
0.76	60.4	62.	1.56	156.4	160.
0.77	61.4	63.	1.57	157.8	162.
0.78	62.4	64.	1.58	159.2	163.
0.79	63.4	65.	1.59	160.6	165.

TS1323

NO.2 A.W.B.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
1.60	162.0	166.	4.00	288.6	296.
1.61	163.4	168.	4.05	291.2	299.
1.62	164.8	169.	4.10	293.9	301.
1.63	166.2	170.	4.15	296.5	304.
1.64	167.6	172.	4.20	299.2	307.
1.65	169.0	173.	4.25	301.9	309.
1.66	170.4	175.	4.30	304.5	312.
1.67	171.8	176.	4.35	307.2	315.
1.68	173.2	178.	4.40	309.8	318.
1.69	174.6	179.	4.45	312.5	320.
1.70	176.0	180.	4.50	315.1	323.
1.71	177.4	182.	4.55	317.8	326.
1.72	178.8	183.	4.60	320.4	328.
1.73	180.2	185.	4.65	323.1	331.
1.74	181.6	186.	4.70	325.8	334.
1.75	183.0	188.	4.75	328.4	337.
1.76	184.4	189.	4.80	331.0	339.
1.77	185.8	190.	4.85	333.7	342.
1.78	186.6	191.	4.90	336.3	345.
1.79	186.9	192.	4.95	338.9	347.
1.80	187.3	192.	5.00	341.6	350.
1.81	187.6	192.	5.05	344.2	353.
1.82	187.9	193.	5.10	346.8	355.
1.83	188.3	193.	5.15	349.4	358.
1.84	188.6	193.	5.20	352.0	361.
1.85	189.0	194.	5.25	354.6	363.
1.86	189.3	194.	5.30	357.2	366.
1.87	189.7	194.	5.35	359.8	369.
1.88	190.0	195.	5.40	362.3	371.
1.89	190.4	195.	5.45	364.9	374.
1.90	190.7	195.	5.50	367.4	377.
1.91	191.1	196.	5.55	370.0	379.
1.92	191.4	196.	5.60	372.5	382.
1.93	191.8	197.	5.65	375.0	384.
1.94	192.1	197.	5.70	377.5	387.
1.95	192.5	197.	5.75	380.0	390.
1.96	192.9	198.	5.80	382.5	392.
1.97	193.2	198.	5.85	385.0	395.
1.98	193.6	198.	5.90	387.4	397.
1.99	194.0	199.	5.95	389.9	400.
2.00	194.3	199.	6.00	392.3	402.
2.05	196.2	201.	6.05	394.8	405.
2.10	198.2	203.	6.10	397.2	407.
2.15	200.1	205.	6.15	399.6	410.
2.20	202.1	207.	6.20	401.9	412.
2.25	204.1	209.	6.25	404.3	414.
2.30	206.1	211.	6.30	406.6	417.
2.35	208.2	213.	6.35	409.0	419.
2.40	210.3	216.	6.40	411.3	422.
2.45	212.4	218.	6.45	413.6	424.
2.50	214.6	220.	6.50	415.8	426.
2.55	216.8	222.	6.55	418.0	428.
2.60	219.0	225.	6.60	420.2	431.
2.65	221.3	227.	6.65	422.4	433.
2.70	223.6	229.	6.70	424.6	435.
2.75	225.9	231.	6.75	426.8	437.
2.80	228.2	234.	6.80	429.0	440.
2.85	230.5	236.	6.85	431.2	442.
2.90	232.8	239.	6.90	433.4	444.
2.95	235.2	241.	6.95	435.6	446.
3.00	237.6	244.	7.00	437.3	448.
3.05	240.1	246.	7.05	438.6	450.
3.10	242.5	249.	7.10	439.9	451.
3.15	245.0	251.	7.15	441.2	452.
3.20	247.4	254.	7.20	442.5	454.
3.25	249.9	256.	7.25	443.9	455.
3.30	252.4	259.	7.30	445.2	456.
3.35	254.9	261.	7.35	446.6	458.
3.40	257.4	264.	7.40	448.0	459.
3.45	260.0	266.	7.45	449.4	461.
3.50	262.5	269.	7.50	450.9	462.
3.55	265.1	272.	7.55	452.4	464.
3.60	267.7	274.	7.60	453.8	465.
3.65	270.3	277.	7.65	455.3	467.
3.70	272.9	280.	7.70	456.9	468.
3.75	275.5	282.	7.75	458.4	470.
3.80	278.1	285.	7.80	459.9	471.
3.85	280.7	288.	7.85	461.5	473.
3.90	283.3	290.	7.90	463.1	475.
3.95	285.9	293.	7.95	464.7	476.

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TS1323

NO.2 A.W.B.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	466.3	478.	12.00	626.0	642.
8.05	467.9	480.	12.05	628.2	644.
8.10	469.6	481.	12.10	630.4	646.
8.15	471.2	483.	12.15	632.6	648.
8.20	472.9	485.	12.20	634.7	651.
8.25	474.6	486.	12.25	636.9	653.
8.30	476.3	488.	12.30	639.1	655.
8.35	478.0	490.	12.35	641.3	657.
8.40	479.7	492.	12.40	643.5	660.
8.45	481.5	493.	12.45	645.6	662.
8.50	483.2	495.	12.50	647.8	664.
8.55	485.0	497.	12.55	650.0	666.
8.60	486.8	499.	12.60	652.2	669.
8.65	488.6	501.	12.65	654.4	671.
8.70	490.4	503.	12.70	656.6	673.
8.75	492.2	504.	12.75	658.8	675.
8.80	494.0	506.	12.80	661.0	677.
8.85	495.9	508.	12.85	663.2	680.
8.90	497.7	510.	12.90	665.3	682.
8.95	499.6	512.	12.95	667.5	684.
9.00	501.4	514.	13.00	669.7	686.
9.05	503.3	516.	13.05	671.9	689.
9.10	505.2	518.	13.10	674.1	691.
9.15	507.1	520.	13.15	676.3	693.
9.20	509.0	522.	13.20	678.5	695.
9.25	511.0	524.	13.25	680.7	698.
9.30	512.9	526.	13.30	682.9	700.
9.35	514.8	528.	13.35	685.1	702.
9.40	516.8	530.	13.40	687.2	704.
9.45	518.8	532.	13.45	689.4	707.
9.50	520.7	534.	13.50	691.6	709.
9.55	522.7	536.	13.55	693.8	711.
9.60	524.7	538.	13.60	696.0	713.
9.65	526.7	540.	13.65	698.2	716.
9.70	528.7	542.	13.70	700.4	718.
9.75	530.7	544.	13.75	702.6	720.
9.80	532.7	546.	13.80	704.8	722.
9.85	534.8	548.	13.85	707.0	725.
9.90	536.8	550.	13.90	709.2	727.
9.95	538.8	552.	13.95	711.4	729.
10.00	540.9	554.	14.00	713.6	731.
10.05	542.9	557.	14.05	715.7	734.
10.10	545.0	559.	14.10	717.9	736.
10.15	547.1	561.	14.15	720.1	738.
10.20	549.1	563.	14.20	722.3	740.
10.25	551.2	565.	14.25	724.5	743.
10.30	553.3	567.	14.30	726.7	745.
10.35	555.4	569.	14.35	728.9	747.
10.40	557.5	571.	14.40	731.1	749.
10.45	559.6	574.	14.45	733.3	752.
10.50	561.7	576.	14.50	735.5	754.
10.55	563.8	578.	14.55	737.7	756.
10.60	565.9	580.	14.60	739.9	758.
10.65	568.0	582.	14.65	742.0	761.
10.70	570.1	584.	14.70	744.2	763.
10.75	572.2	587.	14.75	746.4	765.
10.80	574.3	589.	14.80	748.6	767.
10.85	576.5	591.	14.85	750.8	770.
10.90	578.6	593.	14.90	753.0	772.
10.95	580.7	595.	14.95	755.2	774.
11.00	582.8	597.	15.00	757.4	776.
11.05	585.0	600.	15.05	759.6	779.
11.10	587.1	602.	15.10	761.8	781.
11.15	589.3	604.	15.15	764.0	783.
11.20	591.4	606.	15.20	766.2	785.
11.25	593.6	608.	15.25	768.3	788.
11.30	595.7	611.	15.30	769.9	789.
11.35	597.9	613.	15.35	769.9	789.
11.40	600.0	615.			
11.45	602.2	617.			
11.50	604.3	619.			
11.55	606.5	622.			
11.60	608.7	624.			
11.65	610.8	626.			
11.70	613.0	628.			
11.75	615.2	631.			
11.80	617.3	633.			
11.85	619.5	635.			
11.90	621.7	637.			
11.95	623.8	639.			

NO.2 A.W.B.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.8)	0 (1.)	0.80	64.7	66.
0.01	1.3	1.	0.81	65.7	67.
0.02	1.8	2.	0.82	66.7	68.
0.03	2.3	2.	0.83	67.7	69.
0.04	2.8	3.	0.84	68.7	70.
0.05	3.3	3.	0.85	69.7	71.
0.06	3.9	4.	0.86	70.7	72.
0.07	4.4	5.	0.87	71.7	73.
0.08	5.0	5.	0.88	72.7	75.
0.09	5.5	6.	0.89	73.7	76.
0.10	6.1	6.	0.90	74.7	77.
0.11	6.6	7.	0.91	75.8	78.
0.12	7.2	7.	0.92	76.9	79.
0.13	7.8	8.	0.93	78.0	80.
0.14	8.4	9.	0.94	79.1	81.
0.15	9.0	9.	0.95	80.2	82.
0.16	9.6	10.	0.96	81.4	83.
0.17	10.2	10.	0.97	82.5	85.
0.18	10.8	11.	0.98	83.6	86.
0.19	11.5	12.	0.99	84.8	87.
0.20	12.1	12.	1.00	85.9	88.
0.21	12.7	13.	1.01	87.1	89.
0.22	13.4	14.	1.02	88.2	90.
0.23	14.0	14.	1.03	89.4	92.
0.24	14.7	15.	1.04	90.6	93.
0.25	15.4	16.	1.05	91.7	94.
0.26	16.1	16.	1.06	92.9	95.
0.27	16.7	17.	1.07	94.1	96.
0.28	17.4	18.	1.08	95.3	98.
0.29	18.1	19.	1.09	96.5	99.
0.30	18.8	19.	1.10	97.7	100.
0.31	19.6	20.	1.11	98.9	101.
0.32	20.3	21.	1.12	100.1	103.
0.33	21.0	22.	1.13	101.3	104.
0.34	21.7	22.	1.14	102.5	105.
0.35	22.5	23.	1.15	103.7	106.
0.36	23.2	24.	1.16	104.9	108.
0.37	24.0	25.	1.17	106.1	109.
0.38	24.8	25.	1.18	107.3	110.
0.39	25.5	26.	1.19	108.6	111.
0.40	26.3	27.	1.20	109.8	113.
0.41	27.1	28.	1.21	111.0	114.
0.42	27.9	29.	1.22	112.3	115.
0.43	28.7	29.	1.23	113.5	116.
0.44	29.5	30.	1.24	114.8	118.
0.45	30.3	31.	1.25	116.0	119.
0.46	31.2	32.	1.26	117.3	120.
0.47	32.0	33.	1.27	118.5	121.
0.48	32.8	34.	1.28	119.8	123.
0.49	33.8	35.	1.29	121.1	124.
0.50	34.8	36.	1.30	122.3	125.
0.51	35.8	37.	1.31	123.6	127.
0.52	36.8	38.	1.32	124.9	128.
0.53	37.8	39.	1.33	126.2	129.
0.54	38.8	40.	1.34	127.5	131.
0.55	39.8	41.	1.35	128.8	132.
0.56	40.7	42.	1.36	130.0	133.
0.57	41.7	43.	1.37	131.3	135.
0.58	42.7	44.	1.38	132.7	136.
0.59	43.7	45.	1.39	134.0	137.
0.60	44.7	46.	1.40	135.3	139.
0.61	45.7	47.	1.41	136.6	140.
0.62	46.7	48.	1.42	137.9	141.
0.63	47.7	49.	1.43	139.2	143.
0.64	48.7	50.	1.44	140.6	144.
0.65	49.7	51.	1.45	141.9	145.
0.66	50.7	52.	1.46	143.2	147.
0.67	51.7	53.	1.47	144.6	148.
0.68	52.7	54.	1.48	145.9	150.
0.69	53.7	55.	1.49	147.3	151.
0.70	54.7	56.	1.50	148.7	152.
0.71	55.7	57.	1.51	150.1	154.
0.72	56.7	58.	1.52	151.5	155.
0.73	57.7	59.	1.53	152.9	157.
0.74	58.7	60.	1.54	154.3	158.
0.75	59.7	61.	1.55	155.7	160.
0.76	60.7	62.	1.56	157.1	161.
0.77	61.7	63.	1.57	158.5	162.
0.78	62.7	64.	1.58	159.9	164.
0.79	63.7	65.	1.59	161.3	165.

NO.2 A.W.B.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
1.60	162.7	167.	4.00	289.4	297.
1.61	164.1	168.	4.05	292.0	299.
1.62	165.5	170.	4.10	294.7	302.
1.63	167.0	171.	4.15	297.3	305.
1.64	168.4	173.	4.20	300.0	308.
1.65	169.8	174.	4.25	302.7	310.
1.66	171.2	175.	4.30	305.3	313.
1.67	172.6	177.	4.35	308.0	316.
1.68	174.0	178.	4.40	310.6	318.
1.69	175.4	180.	4.45	313.3	321.
1.70	176.8	181.	4.50	315.9	324.
1.71	178.2	183.	4.55	318.6	327.
1.72	179.6	184.	4.60	321.3	329.
1.73	181.0	186.	4.65	323.9	332.
1.74	182.4	187.	4.70	326.6	335.
1.75	183.8	188.	4.75	329.2	337.
1.76	185.2	190.	4.80	331.9	340.
1.77	186.6	191.	4.85	334.5	343.
1.78	187.4	192.	4.90	337.1	346.
1.79	187.7	192.	4.95	339.7	348.
1.80	188.1	193.	5.00	342.4	351.
1.81	188.4	193.	5.05	345.0	354.
1.82	188.7	193.	5.10	347.6	356.
1.83	189.1	194.	5.15	350.2	359.
1.84	189.4	194.	5.20	352.8	362.
1.85	189.8	195.	5.25	355.4	364.
1.86	190.1	195.	5.30	358.0	367.
1.87	190.5	195.	5.35	360.6	370.
1.88	190.8	196.	5.40	363.1	372.
1.89	191.2	196.	5.45	365.7	375.
1.90	191.5	196.	5.50	368.2	377.
1.91	191.9	197.	5.55	370.8	380.
1.92	192.2	197.	5.60	373.3	383.
1.93	192.6	197.	5.65	375.8	385.
1.94	193.0	198.	5.70	378.4	388.
1.95	193.3	198.	5.75	380.9	390.
1.96	193.7	199.	5.80	383.3	393.
1.97	194.0	199.	5.85	385.8	395.
1.98	194.4	199.	5.90	388.3	398.
1.99	194.8	200.	5.95	390.7	400.
2.00	195.1	200.	6.00	393.1	403.
2.05	197.0	202.	6.05	395.6	405.
2.10	199.0	204.	6.10	398.0	408.
2.15	200.9	206.	6.15	400.4	410.
2.20	202.9	208.	6.20	402.7	413.
2.25	204.9	210.	6.25	405.1	415.
2.30	206.9	212.	6.30	407.4	418.
2.35	209.0	214.	6.35	409.8	420.
2.40	211.1	216.	6.40	412.1	422.
2.45	213.2	219.	6.45	414.4	425.
2.50	215.4	221.	6.50	416.6	427.
2.55	217.6	223.	6.55	418.8	429.
2.60	219.8	225.	6.60	421.0	432.
2.65	222.1	228.	6.65	423.2	434.
2.70	224.4	230.	6.70	425.4	436.
2.75	226.7	232.	6.75	427.6	438.
2.80	229.0	235.	6.80	429.8	441.
2.85	231.3	237.	6.85	432.0	443.
2.90	233.7	239.	6.90	434.2	445.
2.95	236.0	242.	6.95	436.4	447.
3.00	238.4	244.	7.00	438.1	449.
3.05	240.9	247.	7.05	439.4	450.
3.10	243.3	249.	7.10	440.7	452.
3.15	245.8	252.	7.15	442.0	453.
3.20	248.2	254.	7.20	443.3	454.
3.25	250.7	257.	7.25	444.7	456.
3.30	253.2	260.	7.30	446.0	457.
3.35	255.7	262.	7.35	447.4	459.
3.40	258.3	265.	7.40	448.8	460.
3.45	260.8	267.	7.45	450.3	462.
3.50	263.3	270.	7.50	451.7	463.
3.55	265.9	273.	7.55	453.2	464.
3.60	268.5	275.	7.60	454.7	466.
3.65	271.1	278.	7.65	456.2	468.
3.70	273.7	281.	7.70	457.7	469.
3.75	276.3	283.	7.75	459.2	471.
3.80	278.9	286.	7.80	460.7	472.
3.85	281.5	289.	7.85	462.3	474.
3.90	284.1	291.	7.90	463.9	475.
3.95	286.7	294.	7.95	465.5	477.

NO.2 A.W.B.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	467.1	479.	12.00	626.8	642.
8.05	468.7	480.	12.05	629.0	645.
8.10	470.4	482.	12.10	631.2	647.
8.15	472.0	484.	12.15	633.4	649.
8.20	473.7	486.	12.20	635.5	651.
8.25	475.4	487.	12.25	637.7	654.
8.30	477.1	489.	12.30	639.9	656.
8.35	478.8	491.	12.35	642.1	658.
8.40	480.5	493.	12.40	644.3	660.
8.45	482.3	494.	12.45	646.5	663.
8.50	484.0	496.	12.50	648.6	665.
8.55	485.8	498.	12.55	650.8	667.
8.60	487.6	500.	12.60	653.0	669.
8.65	489.4	502.	12.65	655.2	672.
8.70	491.2	503.	12.70	657.4	674.
8.75	493.0	505.	12.75	659.6	676.
8.80	494.8	507.	12.80	661.8	678.
8.85	496.7	509.	12.85	664.0	681.
8.90	498.5	511.	12.90	666.2	683.
8.95	500.4	513.	12.95	668.3	685.
9.00	502.2	515.	13.00	670.5	687.
9.05	504.1	517.	13.05	672.7	690.
9.10	506.0	519.	13.10	674.9	692.
9.15	507.9	521.	13.15	677.1	694.
9.20	509.9	523.	13.20	679.3	696.
9.25	511.8	525.	13.25	681.5	699.
9.30	513.7	527.	13.30	683.7	701.
9.35	515.7	529.	13.35	685.9	703.
9.40	517.6	531.	13.40	688.1	705.
9.45	519.6	533.	13.45	690.2	708.
9.50	521.5	535.	13.50	692.4	710.
9.55	523.5	537.	13.55	694.6	712.
9.60	525.5	539.	13.60	696.8	714.
9.65	527.5	541.	13.65	699.0	716.
9.70	529.5	543.	13.70	701.2	719.
9.75	531.5	545.	13.75	703.4	721.
9.80	533.6	547.	13.80	705.6	723.
9.85	535.6	549.	13.85	707.8	725.
9.90	537.6	551.	13.90	710.0	728.
9.95	539.6	553.	13.95	712.2	730.
10.00	541.7	555.	14.00	714.4	732.
10.05	543.7	557.	14.05	716.5	734.
10.10	545.8	559.	14.10	718.7	737.
10.15	547.9	562.	14.15	720.9	739.
10.20	549.9	564.	14.20	723.1	741.
10.25	552.0	566.	14.25	725.3	743.
10.30	554.1	568.	14.30	727.5	746.
10.35	556.2	570.	14.35	729.7	748.
10.40	558.3	572.	14.40	731.9	750.
10.45	560.4	574.	14.45	734.1	752.
10.50	562.5	577.	14.50	736.3	755.
10.55	564.6	579.	14.55	738.5	757.
10.60	566.7	581.	14.60	740.7	759.
10.65	568.8	583.	14.65	742.8	761.
10.70	570.9	585.	14.70	745.0	764.
10.75	573.0	587.	14.75	747.2	766.
10.80	575.1	590.	14.80	749.4	768.
10.85	577.3	592.	14.85	751.6	770.
10.90	579.4	594.	14.90	753.8	773.
10.95	581.5	596.	14.95	756.0	775.
11.00	583.7	598.	15.00	758.2	777.
11.05	585.8	600.	15.05	760.4	779.
11.10	587.9	603.	15.10	762.6	782.
11.15	590.1	605.	15.15	764.8	784.
11.20	592.2	607.	15.20	767.0	786.
11.25	594.4	609.	15.25	769.1	788.
11.30	596.5	611.	15.30	770.7	790.
11.35	598.7	614.	15.35	770.7	790.
11.40	600.8	616.			
11.45	603.0	618.			
11.50	605.1	620.			
11.55	607.3	622.			
11.60	609.5	625.			
11.65	611.6	627.			
11.70	613.8	629.			
11.75	616.0	631.			
11.80	618.1	634.			
11.85	620.3	636.			
11.90	622.5	638.			
11.95	624.7	640.			

NO.3 BTM.W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (2.1)	0 (2.)	0.80	155.5	159.
0.01	3.4	3.	0.81	157.8	162.
0.02	4.7	5.	0.82	160.1	164.
0.03	6.1	6.	0.83	162.4	166.
0.04	7.6	8.	0.84	164.7	169.
0.05	9.0	9.	0.85	167.0	171.
0.06	10.5	11.	0.86	169.3	174.
0.07	12.0	12.	0.87	171.6	176.
0.08	13.6	14.	0.88	173.9	178.
0.09	15.1	15.	0.89	176.3	181.
0.10	16.7	17.	0.90	178.6	183.
0.11	18.3	19.	0.91	181.0	185.
0.12	19.9	20.	0.92	183.3	188.
0.13	21.5	22.	0.93	185.6	190.
0.14	23.1	24.	0.94	188.0	193.
0.15	24.8	25.	0.95	190.4	195.
0.16	26.5	27.	0.96	192.7	198.
0.17	28.2	29.	0.97	195.1	200.
0.18	29.9	31.	0.98	197.5	202.
0.19	31.6	32.	0.99	199.9	205.
0.20	33.3	34.	1.00	202.3	207.
0.21	35.1	36.	1.01	204.7	210.
0.22	36.8	38.	1.02	207.1	212.
0.23	38.6	40.	1.03	209.5	215.
0.24	40.4	41.	1.04	211.9	217.
0.25	42.2	43.	1.05	214.3	220.
0.26	44.0	45.	1.06	216.8	222.
0.27	45.8	47.	1.07	219.2	225.
0.28	47.6	49.	1.08	221.6	227.
0.29	49.5	51.	1.09	224.1	230.
0.30	51.3	53.	1.10	226.6	232.
0.31	53.2	54.	1.11	229.0	235.
0.32	55.0	56.	1.12	231.5	237.
0.33	56.9	58.	1.13	234.0	240.
0.34	58.8	60.	1.14	236.4	242.
0.35	60.7	62.	1.15	238.9	245.
0.36	62.6	64.	1.16	241.4	247.
0.37	64.6	66.	1.17	243.9	250.
0.38	66.5	68.	1.18	246.4	253.
0.39	68.4	70.	1.19	248.9	255.
0.40	70.4	72.	1.20	251.4	258.
0.41	72.4	74.	1.21	253.9	260.
0.42	74.3	76.	1.22	256.4	263.
0.43	76.3	78.	1.23	259.0	265.
0.44	78.3	80.	1.24	261.5	268.
0.45	80.3	82.	1.25	264.0	271.
0.46	82.3	84.	1.26	266.6	273.
0.47	84.3	86.	1.27	269.1	276.
0.48	86.4	89.	1.28	271.7	278.
0.49	88.4	91.	1.29	274.2	281.
0.50	90.5	93.	1.30	276.8	284.
0.51	92.5	95.	1.31	279.4	286.
0.52	94.6	97.	1.32	281.9	289.
0.53	96.6	99.	1.33	284.5	292.
0.54	98.7	101.	1.34	287.1	294.
0.55	100.8	103.	1.35	289.7	297.
0.56	102.9	105.	1.36	292.3	300.
0.57	105.0	108.	1.37	294.9	302.
0.58	107.1	110.	1.38	297.5	305.
0.59	109.3	112.	1.39	300.1	308.
0.60	111.4	114.	1.40	302.7	310.
0.61	113.5	116.	1.41	305.3	313.
0.62	115.7	119.	1.42	307.9	316.
0.63	117.8	121.	1.43	310.6	318.
0.64	120.0	123.	1.44	313.2	321.
0.65	122.1	125.	1.45	315.8	324.
0.66	124.3	127.	1.46	318.5	326.
0.67	126.5	130.	1.47	321.1	329.
0.68	128.7	132.	1.48	323.8	332.
0.69	130.9	134.	1.49	326.4	335.
0.70	133.1	136.	1.50	329.1	337.
0.71	135.3	139.	1.51	331.8	340.
0.72	137.5	141.	1.52	334.4	343.
0.73	139.7	143.	1.53	337.1	346.
0.74	142.0	146.	1.54	339.8	348.
0.75	144.2	148.	1.55	342.4	351.
0.76	146.5	150.	1.56	345.1	354.
0.77	148.7	152.	1.57	347.8	357.
0.78	151.0	155.	1.58	350.5	359.
0.79	153.2	157.	1.59	353.2	362.

NO.3 BTM.W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
1.60	355.9	365.
1.61	358.6	368.
1.62	361.2	370.
1.63	363.9	373.
1.64	366.6	376.
1.65	369.3	379.
1.66	372.0	381.
1.67	374.7	384.
1.68	377.4	387.
1.69	380.0	390.
1.70	382.7	392.
1.71	385.4	395.
1.72	388.1	398.
1.73	390.7	401.
1.74	393.4	403.
1.75	396.1	406.
1.76	398.8	409.
1.77	401.4	411.
1.78	402.6	413.
1.79	402.6	413.

NO.4 F.WING W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (1.0)	0 (1.)	4.00	135.8	139.
0.05	2.4	2.	4.05	137.5	141.
0.10	3.8	4.	4.10	139.3	143.
0.15	5.2	5.	4.15	141.0	145.
0.20	6.6	7.	4.20	142.8	146.
0.25	8.1	8.	4.25	144.6	148.
0.30	9.5	10.	4.30	146.3	150.
0.35	11.0	11.	4.35	148.1	152.
0.40	12.5	13.	4.40	149.8	154.
0.45	14.0	14.	4.45	151.6	155.
0.50	15.6	16.	4.50	153.3	157.
0.55	17.1	18.	4.55	155.1	159.
0.60	18.7	19.	4.60	156.8	161.
0.65	20.3	21.	4.65	158.6	163.
0.70	21.8	22.	4.70	160.3	164.
0.75	23.4	24.	4.75	162.1	166.
0.80	25.0	26.	4.80	163.8	168.
0.85	26.6	27.	4.85	165.6	170.
0.90	28.3	29.	4.90	167.4	172.
0.95	29.9	31.	4.95	169.1	173.
1.00	31.6	32.	5.00	170.9	175.
1.05	33.3	34.	5.05	172.6	177.
1.10	34.9	36.	5.10	174.4	179.
1.15	36.6	38.	5.15	176.1	181.
1.20	38.3	39.	5.20	177.9	182.
1.25	40.0	41.	5.25	179.6	184.
1.30	41.7	43.	5.30	181.4	186.
1.35	43.4	44.	5.35	183.1	188.
1.40	45.1	46.	5.40	184.9	190.
1.45	46.8	48.	5.45	186.6	191.
1.50	48.5	50.	5.50	188.4	193.
1.55	50.2	51.	5.55	190.1	195.
1.60	52.0	53.	5.60	191.9	197.
1.65	53.7	55.	5.65	193.7	198.
1.70	55.4	57.	5.70	195.4	200.
1.75	57.1	59.	5.75	197.2	202.
1.80	58.9	60.	5.80	198.9	204.
1.85	60.6	62.	5.85	200.7	206.
1.90	62.3	64.	5.90	202.4	207.
1.95	64.1	66.	5.95	204.2	209.
2.00	65.8	67.	6.00	205.9	211.
2.05	67.5	69.	6.05	207.7	213.
2.10	69.3	71.	6.10	209.4	215.
2.15	71.0	73.	6.15	211.2	216.
2.20	72.8	75.	6.20	212.9	218.
2.25	74.5	76.	6.25	214.7	220.
2.30	76.2	78.	6.30	216.4	222.
2.35	78.0	80.	6.35	218.2	224.
2.40	79.7	82.	6.40	220.0	225.
2.45	81.4	83.	6.45	221.7	227.
2.50	83.2	85.	6.50	223.5	229.
2.55	84.9	87.	6.55	225.2	231.
2.60	86.7	89.	6.60	227.0	233.
2.65	88.4	91.	6.65	228.7	234.
2.70	90.2	92.	6.70	230.5	236.
2.75	91.9	94.	6.75	232.2	238.
2.80	93.7	96.	6.80	234.0	240.
2.85	95.5	98.	6.85	235.7	242.
2.90	97.2	100.	6.90	237.5	243.
2.95	99.0	101.	6.95	239.2	245.
3.00	100.7	103.	7.00	241.0	247.
3.05	102.5	105.	7.05	242.8	249.
3.10	104.2	107.	7.10	244.5	251.
3.15	106.0	109.	7.15	246.3	252.
3.20	107.7	110.	7.20	248.0	254.
3.25	109.5	112.	7.25	249.8	256.
3.30	111.2	114.	7.30	251.5	258.
3.35	113.0	116.	7.35	253.3	260.
3.40	114.7	118.	7.40	255.0	261.
3.45	116.5	119.	7.45	256.8	263.
3.50	118.3	121.	7.50	258.5	265.
3.55	120.0	123.	7.55	260.3	267.
3.60	121.8	125.	7.60	262.0	269.
3.65	123.5	127.	7.65	263.8	270.
3.70	125.3	128.	7.70	265.5	272.
3.75	127.0	130.	7.75	267.3	274.
3.80	128.8	132.	7.80	269.0	276.
3.85	130.5	134.	7.85	270.8	278.
3.90	132.3	136.	7.90	272.6	279.
3.95	134.0	137.	7.95	274.3	281.

NO.4 F.WING W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	276.1	283.	12.00	416.3	427.
8.05	277.8	285.	12.05	418.1	429.
8.10	279.6	287.	12.10	419.8	430.
8.15	281.3	288.	12.15	421.6	432.
8.20	283.1	290.	12.20	423.4	434.
8.25	284.8	292.	12.25	425.1	436.
8.30	286.6	294.	12.30	426.9	438.
8.35	288.3	296.	12.35	428.6	439.
8.40	290.1	297.	12.40	430.4	441.
8.45	291.8	299.	12.45	432.1	443.
8.50	293.6	301.	12.50	433.9	445.
8.55	295.3	303.	12.55	435.6	447.
8.60	297.1	305.	12.60	437.4	448.
8.65	298.9	306.	12.65	439.1	450.
8.70	300.6	308.	12.70	440.9	452.
8.75	302.4	310.	12.75	442.6	454.
8.80	304.1	312.	12.80	444.4	456.
8.85	305.9	314.	12.85	446.1	457.
8.90	307.6	315.	12.90	447.9	459.
8.95	309.4	317.	12.95	449.7	461.
9.00	311.1	319.	13.00	451.4	463.
9.05	312.9	321.	13.05	453.2	464.
9.10	314.6	323.	13.10	454.9	466.
9.15	316.4	324.	13.15	456.7	468.
9.20	318.1	326.	13.20	458.4	470.
9.25	319.9	328.	13.25	460.2	472.
9.30	321.7	330.	13.30	461.9	473.
9.35	323.4	331.	13.35	463.7	475.
9.40	325.2	333.	13.40	465.4	477.
9.45	326.9	335.	13.45	467.2	479.
9.50	328.7	337.	13.50	468.9	481.
9.55	330.4	339.	13.55	469.1	481.
9.60	332.2	340.	13.60	469.1	481.
9.65	333.9	342.			
9.70	335.7	344.			
9.75	337.4	346.			
9.80	339.2	348.			
9.85	340.9	349.			
9.90	342.7	351.			
9.95	344.4	353.			
10.00	346.2	355.			
10.05	348.0	357.			
10.10	349.7	358.			
10.15	351.5	360.			
10.20	353.2	362.			
10.25	355.0	364.			
10.30	356.7	366.			
10.35	358.5	367.			
10.40	360.2	369.			
10.45	362.0	371.			
10.50	363.7	373.			
10.55	365.5	375.			
10.60	367.2	376.			
10.65	369.0	378.			
10.70	370.7	380.			
10.75	372.5	382.			
10.80	374.3	384.			
10.85	376.0	385.			
10.90	377.8	387.			
10.95	379.5	389.			
11.00	381.3	391.			
11.05	383.0	393.			
11.10	384.8	394.			
11.15	386.5	396.			
11.20	388.3	398.			
11.25	390.0	400.			
11.30	391.8	402.			
11.35	393.5	403.			
11.40	395.3	405.			
11.45	397.1	407.			
11.50	398.8	409.			
11.55	400.6	411.			
11.60	402.3	412.			
11.65	404.1	414.			
11.70	405.8	416.			
11.75	407.6	418.			
11.80	409.3	420.			
11.85	411.1	421.			
11.90	412.8	423.			
11.95	414.6	425.			

NO.4 BTM.W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (4.6)	0 (5.)	0.80	262.9	269.
0.01	7.4	8.	0.81	266.3	273.
0.02	10.3	11.	0.82	269.7	276.
0.03	13.2	14.	0.83	273.2	280.
0.04	16.2	17.	0.84	276.6	284.
0.05	19.2	20.	0.85	280.0	287.
0.06	22.1	23.	0.86	283.5	291.
0.07	25.1	26.	0.87	286.9	294.
0.08	28.1	29.	0.88	290.4	298.
0.09	31.2	32.	0.89	293.8	301.
0.10	34.2	35.	0.90	297.3	305.
0.11	37.2	38.	0.91	300.8	308.
0.12	40.3	41.	0.92	304.2	312.
0.13	43.3	44.	0.93	307.7	315.
0.14	46.4	48.	0.94	311.1	319.
0.15	49.5	51.	0.95	314.6	322.
0.16	52.6	54.	0.96	318.1	326.
0.17	55.7	57.	0.97	321.5	330.
0.18	58.8	60.	0.98	325.0	333.
0.19	61.9	63.	0.99	328.5	337.
0.20	65.0	67.	1.00	331.9	340.
0.21	68.2	70.	1.01	335.4	344.
0.22	71.3	73.	1.02	338.9	347.
0.23	74.5	76.	1.03	342.4	351.
0.24	77.6	80.	1.04	345.8	354.
0.25	80.8	83.	1.05	349.3	358.
0.26	83.9	86.	1.06	352.8	362.
0.27	87.1	89.	1.07	356.3	365.
0.28	90.3	93.	1.08	359.8	369.
0.29	93.5	96.	1.09	363.3	372.
0.30	96.7	99.	1.10	366.8	376.
0.31	99.9	102.	1.11	370.3	380.
0.32	103.1	106.	1.12	373.8	383.
0.33	106.3	109.	1.13	377.3	387.
0.34	109.5	112.	1.14	380.8	390.
0.35	112.8	116.	1.15	384.3	394.
0.36	116.0	119.	1.16	387.9	398.
0.37	119.2	122.	1.17	391.4	401.
0.38	122.5	126.	1.18	394.9	405.
0.39	125.7	129.	1.19	398.4	408.
0.40	129.0	132.	1.20	401.9	412.
0.41	132.2	136.	1.21	405.5	416.
0.42	135.5	139.	1.22	409.0	419.
0.43	138.8	142.	1.23	412.5	423.
0.44	142.0	146.	1.24	416.1	426.
0.45	145.3	149.	1.25	419.6	430.
0.46	148.6	152.	1.26	423.2	434.
0.47	151.9	156.	1.27	426.7	437.
0.48	155.2	159.	1.28	430.2	441.
0.49	158.5	162.	1.29	433.8	445.
0.50	161.8	166.	1.30	437.3	448.
0.51	165.1	169.	1.31	440.9	452.
0.52	168.4	173.	1.32	444.4	456.
0.53	171.7	176.	1.33	448.0	459.
0.54	175.0	179.	1.34	451.6	463.
0.55	178.4	183.	1.35	455.1	466.
0.56	181.7	186.	1.36	458.7	470.
0.57	185.0	190.	1.37	462.2	474.
0.58	188.4	193.	1.38	465.8	477.
0.59	191.7	197.	1.39	469.4	481.
0.60	195.1	200.	1.40	473.0	485.
0.61	198.4	203.	1.41	476.5	488.
0.62	201.8	207.	1.42	480.1	492.
0.63	205.1	210.	1.43	483.7	496.
0.64	208.5	214.	1.44	487.3	499.
0.65	211.9	217.	1.45	490.8	503.
0.66	215.3	221.	1.46	494.4	507.
0.67	218.6	224.	1.47	498.0	510.
0.68	222.0	228.	1.48	501.6	514.
0.69	225.4	231.	1.49	505.2	518.
0.70	228.8	235.	1.50	508.8	521.
0.71	232.2	238.	1.51	512.4	525.
0.72	235.6	241.	1.52	516.0	529.
0.73	239.0	245.	1.53	519.6	533.
0.74	242.4	248.	1.54	523.2	536.
0.75	245.8	252.	1.55	526.8	540.
0.76	249.2	255.	1.56	530.4	544.
0.77	252.6	259.	1.57	534.0	547.
0.78	256.0	262.	1.58	537.6	551.
0.79	259.4	266.	1.59	541.2	555.

NO.4 BTM.W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
1.60	544.8	558.
1.61	548.4	562.
1.62	552.0	566.
1.63	555.6	570.
1.64	559.2	573.
1.65	562.9	577.
1.66	566.5	581.
1.67	570.1	584.
1.68	573.7	588.
1.69	577.3	592.
1.70	580.9	595.
1.71	584.5	599.
1.72	588.1	603.
1.73	591.7	606.
1.74	595.3	610.
1.75	598.9	614.
1.76	602.5	618.
1.77	606.2	621.
1.78	608.4	624.
1.79	608.4	624.

NO.4 A.WING W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (1.4)	0 (1.)	4.00	175.3	180.
0.05	3.4	4.	4.05	177.5	182.
0.10	5.4	6.	4.10	179.7	184.
0.15	7.5	8.	4.15	181.9	186.
0.20	9.5	10.	4.20	184.0	189.
0.25	11.6	12.	4.25	186.2	191.
0.30	13.6	14.	4.30	188.4	193.
0.35	15.7	16.	4.35	190.6	195.
0.40	17.8	18.	4.40	192.8	198.
0.45	20.0	20.	4.45	195.0	200.
0.50	22.1	23.	4.50	197.2	202.
0.55	24.2	25.	4.55	199.4	204.
0.60	26.4	27.	4.60	201.6	207.
0.65	28.5	29.	4.65	203.8	209.
0.70	30.7	31.	4.70	206.0	211.
0.75	32.9	34.	4.75	208.2	213.
0.80	35.0	36.	4.80	210.4	216.
0.85	37.2	38.	4.85	212.5	218.
0.90	39.4	40.	4.90	214.7	220.
0.95	41.6	43.	4.95	216.9	222.
1.00	43.8	45.	5.00	219.1	225.
1.05	46.0	47.	5.05	221.3	227.
1.10	48.2	49.	5.10	223.5	229.
1.15	50.3	52.	5.15	225.7	231.
1.20	52.5	54.	5.20	227.9	234.
1.25	54.7	56.	5.25	230.1	236.
1.30	56.9	58.	5.30	232.3	238.
1.35	59.1	61.	5.35	234.5	240.
1.40	61.3	63.	5.40	236.7	243.
1.45	63.5	65.	5.45	238.8	245.
1.50	65.7	67.	5.50	241.0	247.
1.55	67.9	70.	5.55	243.2	249.
1.60	70.1	72.	5.60	245.4	252.
1.65	72.3	74.	5.65	247.6	254.
1.70	74.5	76.	5.70	249.8	256.
1.75	76.7	79.	5.75	252.0	258.
1.80	78.8	81.	5.80	254.2	261.
1.85	81.0	83.	5.85	256.4	263.
1.90	83.2	85.	5.90	258.6	265.
1.95	85.4	88.	5.95	260.8	267.
2.00	87.6	90.	6.00	263.0	270.
2.05	89.8	92.	6.05	265.2	272.
2.10	92.0	94.	6.10	267.3	274.
2.15	94.2	97.	6.15	269.5	276.
2.20	96.4	99.	6.20	271.7	279.
2.25	98.6	101.	6.25	273.9	281.
2.30	100.8	103.	6.30	276.1	283.
2.35	103.0	106.	6.35	278.3	285.
2.40	105.2	108.	6.40	280.5	288.
2.45	107.3	110.	6.45	282.7	290.
2.50	109.5	112.	6.50	284.9	292.
2.55	111.7	115.	6.55	287.1	294.
2.60	113.9	117.	6.60	289.3	296.
2.65	116.1	119.	6.65	291.4	299.
2.70	118.3	121.	6.70	293.6	301.
2.75	120.5	124.	6.75	295.8	303.
2.80	122.7	126.	6.80	298.0	305.
2.85	124.9	128.	6.85	300.2	308.
2.90	127.1	130.	6.90	302.4	310.
2.95	129.3	132.	6.95	304.6	312.
3.00	131.4	135.	7.00	306.8	314.
3.05	133.6	137.	7.05	309.0	317.
3.10	135.8	139.	7.10	311.2	319.
3.15	138.0	141.	7.15	313.4	321.
3.20	140.2	144.	7.20	315.6	323.
3.25	142.4	146.	7.25	317.7	326.
3.30	144.6	148.	7.30	319.9	328.
3.35	146.8	150.	7.35	322.1	330.
3.40	149.0	153.	7.40	324.3	332.
3.45	151.2	155.	7.45	326.5	335.
3.50	153.4	157.	7.50	328.7	337.
3.55	155.6	159.	7.55	330.9	339.
3.60	157.7	162.	7.60	333.1	341.
3.65	159.9	164.	7.65	335.3	344.
3.70	162.1	166.	7.70	337.5	346.
3.75	164.3	168.	7.75	339.7	348.
3.80	166.5	171.	7.80	341.9	350.
3.85	168.7	173.	7.85	344.1	353.
3.90	170.9	175.	7.90	346.2	355.
3.95	173.1	177.	7.95	348.4	357.

NO.4 A.WING W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	350.6	359.	12.00	526.0	539.
8.05	352.8	362.	12.05	528.2	541.
8.10	355.0	364.	12.10	530.4	544.
8.15	357.2	366.	12.15	532.6	546.
8.20	359.4	368.	12.20	534.7	548.
8.25	361.6	371.	12.25	536.9	550.
8.30	363.8	373.	12.30	539.1	553.
8.35	366.0	375.	12.35	541.3	555.
8.40	368.2	377.	12.40	543.5	557.
8.45	370.4	380.	12.45	545.7	559.
8.50	372.5	382.	12.50	547.9	562.
8.55	374.7	384.	12.55	550.1	564.
8.60	376.9	386.	12.60	552.3	566.
8.65	379.1	389.	12.65	554.5	568.
8.70	381.3	391.	12.70	556.7	571.
8.75	383.5	393.	12.75	558.8	573.
8.80	385.7	395.	12.80	561.0	575.
8.85	387.9	398.	12.85	563.2	577.
8.90	390.1	400.	12.90	565.4	580.
8.95	392.3	402.	12.95	567.6	582.
9.00	394.5	404.	13.00	569.8	584.
9.05	396.7	407.	13.05	572.0	586.
9.10	398.9	409.	13.10	574.2	589.
9.15	401.0	411.	13.15	576.4	591.
9.20	403.2	413.	13.20	578.6	593.
9.25	405.4	416.	13.25	580.8	595.
9.30	407.6	418.	13.30	583.0	598.
9.35	409.8	420.	13.35	585.1	600.
9.40	412.0	422.	13.40	587.3	602.
9.45	414.2	425.	13.45	589.5	604.
9.50	416.4	427.	13.50	590.8	606.
9.55	418.6	429.	13.55	590.8	606.
9.60	420.8	431.			
9.65	423.0	434.			
9.70	425.1	436.			
9.75	427.3	438.			
9.80	429.5	440.			
9.85	431.7	443.			
9.90	433.9	445.			
9.95	436.1	447.			
10.00	438.3	449.			
10.05	440.5	452.			
10.10	442.7	454.			
10.15	444.9	456.			
10.20	447.1	458.			
10.25	449.3	460.			
10.30	451.4	463.			
10.35	453.6	465.			
10.40	455.8	467.			
10.45	458.0	469.			
10.50	460.2	472.			
10.55	462.4	474.			
10.60	464.6	476.			
10.65	466.8	478.			
10.70	469.0	481.			
10.75	471.2	483.			
10.80	473.4	485.			
10.85	475.6	487.			
10.90	477.8	490.			
10.95	479.9	492.			
11.00	482.1	494.			
11.05	484.3	496.			
11.10	486.5	499.			
11.15	488.7	501.			
11.20	490.9	503.			
11.25	493.1	505.			
11.30	495.3	508.			
11.35	497.5	510.			
11.40	499.7	512.			
11.45	501.9	514.			
11.50	504.1	517.			
11.55	506.2	519.			
11.60	508.4	521.			
11.65	510.6	523.			
11.70	512.8	526.			
11.75	515.0	528.			
11.80	517.2	530.			
11.85	519.4	532.			
11.90	521.6	535.			
11.95	523.8	537.			

NO.5 BTM.W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (3.0)	0 (3.)	0.80	207.2	212.
0.01	4.9	5.	0.81	210.2	215.
0.02	6.9	7.	0.82	213.2	218.
0.03	8.8	9.	0.83	216.1	222.
0.04	10.9	11.	0.84	219.1	225.
0.05	12.9	13.	0.85	222.1	228.
0.06	15.0	15.	0.86	225.1	231.
0.07	17.1	18.	0.87	228.1	234.
0.08	19.2	20.	0.88	231.1	237.
0.09	21.3	22.	0.89	234.1	240.
0.10	23.5	24.	0.90	237.1	243.
0.11	25.7	26.	0.91	240.1	246.
0.12	27.9	29.	0.92	243.1	249.
0.13	30.1	31.	0.93	246.2	252.
0.14	32.3	33.	0.94	249.2	255.
0.15	34.6	35.	0.95	252.2	259.
0.16	36.9	38.	0.96	255.3	262.
0.17	39.2	40.	0.97	258.3	265.
0.18	41.5	43.	0.98	261.4	268.
0.19	43.8	45.	0.99	264.4	271.
0.20	46.1	47.	1.00	267.5	274.
0.21	48.5	50.	1.01	270.6	277.
0.22	50.8	52.	1.02	273.7	280.
0.23	53.2	55.	1.03	276.7	284.
0.24	55.6	57.	1.04	279.8	287.
0.25	58.0	59.	1.05	282.9	290.
0.26	60.4	62.	1.06	286.0	293.
0.27	62.9	64.	1.07	289.2	296.
0.28	65.3	67.	1.08	292.3	300.
0.29	67.8	69.	1.09	295.4	303.
0.30	70.3	72.	1.10	298.5	306.
0.31	72.7	75.	1.11	301.6	309.
0.32	75.2	77.	1.12	304.8	312.
0.33	77.8	80.	1.13	307.9	316.
0.34	80.3	82.	1.14	311.0	319.
0.35	82.8	85.	1.15	314.2	322.
0.36	85.4	87.	1.16	317.3	325.
0.37	87.9	90.	1.17	320.5	328.
0.38	90.5	93.	1.18	323.6	332.
0.39	93.1	95.	1.19	326.8	335.
0.40	95.7	98.	1.20	329.9	338.
0.41	98.3	101.	1.21	333.1	341.
0.42	100.9	103.	1.22	336.3	345.
0.43	103.5	106.	1.23	339.5	348.
0.44	106.2	109.	1.24	342.7	351.
0.45	108.8	112.	1.25	345.9	355.
0.46	111.5	114.	1.26	349.1	358.
0.47	114.1	117.	1.27	352.3	361.
0.48	116.8	120.	1.28	355.5	364.
0.49	119.5	123.	1.29	358.7	368.
0.50	122.2	125.	1.30	361.9	371.
0.51	124.9	128.	1.31	365.1	374.
0.52	127.6	131.	1.32	368.3	378.
0.53	130.4	134.	1.33	371.6	381.
0.54	133.1	136.	1.34	374.8	384.
0.55	135.8	139.	1.35	378.1	388.
0.56	138.6	142.	1.36	381.3	39[illegible]
0.57	141.4	145.	1.37	384.6	39[illegible]
0.58	144.1	148.	1.38	387.8	398.
0.59	146.9	151.	1.39	391.1	401.
0.60	149.7	153.	1.40	394.3	404.
0.61	152.5	156.	1.41	397.6	408.
0.62	155.3	159.	1.42	400.9	411.
0.63	158.1	162.	1.43	404.1	414.
0.64	161.0	165.	1.44	407.4	418.
0.65	163.8	168.	1.45	410.7	421.
0.66	166.6	171.	1.46	414.0	424.
0.67	169.5	174.	1.47	417.3	428.
0.68	172.3	177.	1.48	420.6	431.
0.69	175.2	180.	1.49	423.9	434.
0.70	178.1	183.	1.50	427.2	438.
0.71	181.0	185.	1.51	430.5	441.
0.72	183.8	188.	1.52	433.8	445.
0.73	186.7	191.	1.53	437.1	448.
0.74	189.6	194.	1.54	440.4	451.
0.75	192.6	197.	1.55	443.8	455.
0.76	195.5	200.	1.56	447.1	458.
0.77	198.4	203.	1.57	450.4	462.
0.78	201.3	206.	1.58	453.8	465.
0.79	204.3	209.	1.59	457.1	469.

NO.5 BTM.W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
1.60	460.4	472.
1.61	463.8	475.
1.62	467.1	479.
1.63	470.4	482.
1.64	473.8	486.
1.65	477.1	489.
1.66	480.5	492.
1.67	483.8	496.
1.68	487.2	499.
1.69	490.5	503.
1.70	493.8	506.
1.71	497.2	510.
1.72	500.5	513.
1.73	503.8	516.
1.74	507.2	520.
1.75	510.6	523.
1.76	513.9	527.
1.77	517.3	530.
1.78	518.7	532.
1.79	518.7	532.

NO.5 WING W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (1.1)	0 (1.)	4.00	154.7	159.
0.05	2.6	3.	4.05	156.8	161.
0.10	4.1	4.	4.10	158.8	163.
0.15	5.6	6.	4.15	160.9	165.
0.20	7.1	7.	4.20	162.9	167.
0.25	8.7	9.	4.25	164.9	169.
0.30	10.3	11.	4.30	167.0	171.
0.35	11.9	12.	4.35	169.1	173.
0.40	13.5	14.	4.40	171.2	175.
0.45	15.2	16.	4.45	173.3	178.
0.50	16.9	17.	4.50	175.3	180.
0.55	18.6	19.	4.55	177.4	182.
0.60	20.3	21.	4.60	179.5	184.
0.65	22.0	23.	4.65	181.6	186.
0.70	23.7	24.	4.70	183.7	188.
0.75	25.5	26.	4.75	185.7	190.
0.80	27.3	28.	4.80	187.8	193.
0.85	29.0	30.	4.85	189.9	195.
0.90	30.8	32.	4.90	192.0	197.
0.95	32.7	33.	4.95	194.1	199.
1.00	34.5	35.	5.00	196.2	201.
1.05	36.4	37.	5.05	198.2	203.
1.10	38.2	39.	5.10	200.3	205.
1.15	40.1	41.	5.15	202.4	207.
1.20	41.9	43.	5.20	204.5	210.
1.25	43.8	45.	5.25	206.6	212.
1.30	45.7	47.	5.30	208.7	214.
1.35	47.6	49.	5.35	210.7	216.
1.40	49.5	51.	5.40	212.8	218.
1.45	51.5	53.	5.45	214.9	220.
1.50	53.4	55.	5.50	217.0	222.
1.55	55.4	57.	5.55	219.1	225.
1.60	57.4	59.	5.60	221.1	227.
1.65	59.3	61.	5.65	223.2	229.
1.70	61.3	63.	5.70	225.3	231.
1.75	63.3	65.	5.75	227.4	233.
1.80	65.2	67.	5.80	229.5	235.
1.85	67.2	69.	5.85	231.6	237.
1.90	69.2	71.	5.90	233.6	239.
1.95	71.2	73.	5.95	235.7	242.
2.00	73.3	75.	6.00	237.8	244.
2.05	75.3	77.	6.05	239.9	246.
2.10	77.3	79.	6.10	242.0	248.
2.15	79.3	81.	6.15	244.1	250.
2.20	81.3	83.	6.20	246.1	252.
2.25	83.4	85.	6.25	248.2	254.
2.30	85.4	88.	6.30	250.3	257.
2.35	87.4	90.	6.35	252.4	259.
2.40	89.5	92.	6.40	254.5	261.
2.45	91.5	94.	6.45	256.5	263.
2.50	93.5	96.	6.50	258.6	265.
2.55	95.6	98.	6.55	260.7	267.
2.60	97.6	100.	6.60	262.8	269.
2.65	99.6	102.	6.65	264.9	271.
2.70	101.7	104.	6.70	267.0	274.
2.75	103.7	106.	6.75	269.0	276.
2.80	105.8	108.	6.80	271.1	278.
2.85	107.8	110.	6.85	273.2	280.
2.90	109.8	113.	6.90	275.3	282.
2.95	111.9	115.	6.95	277.4	284.
3.00	113.9	117.	7.00	279.5	286.
3.05	116.0	119.	7.05	281.5	289.
3.10	118.0	121.	7.10	283.6	291.
3.15	120.0	123.	7.15	285.7	293.
3.20	122.1	125.	7.20	287.8	295.
3.25	124.1	127.	7.25	289.9	297.
3.30	126.2	129.	7.30	291.9	299.
3.35	128.2	131.	7.35	294.0	301.
3.40	130.2	134.	7.40	296.1	304.
3.45	132.3	136.	7.45	298.2	306.
3.50	134.3	138.	7.50	300.3	308.
3.55	136.4	140.	7.55	302.4	310.
3.60	138.4	142.	7.60	304.4	312.
3.65	140.5	144.	7.65	306.5	314.
3.70	142.5	146.	7.70	308.6	316.
3.75	144.5	148.	7.75	310.7	318.
3.80	146.6	150.	7.80	312.8	321.
3.85	148.6	152.	7.85	314.8	323.
3.90	150.7	154.	7.90	316.9	325.
3.95	152.7	157.	7.95	319.0	327.

NO.5 WING W.B.TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	321.1	329.	12.00	487.7	500.
8.05	323.2	331.	12.05	489.8	502.
8.10	325.3	333.	12.10	491.8	504.
8.15	327.3	336.	12.15	493.9	506.
8.20	329.4	338.	12.20	496.0	508.
8.25	331.5	340.	12.25	498.1	511.
8.30	333.6	342.	12.30	500.2	513.
8.35	335.7	344.	12.35	502.3	515.
8.40	337.8	346.	12.40	504.3	517.
8.45	339.8	348.	12.45	506.4	519.
8.50	341.9	350.	12.50	508.5	521.
8.55	344.0	353.	12.55	510.6	523.
8.60	346.1	355.	12.60	512.7	525.
8.65	348.2	357.	12.65	514.7	528.
8.70	350.2	359.	12.70	516.8	530.
8.75	352.3	361.	12.75	518.9	532.
8.80	354.4	363.	12.80	521.0	534.
8.85	356.5	365.	12.85	523.1	536.
8.90	358.6	368.	12.90	525.2	538.
8.95	360.7	370.	12.95	527.2	540.
9.00	362.7	372.	13.00	529.3	543.
9.05	364.8	374.	13.05	531.4	545.
9.10	366.9	376.	13.10	533.5	547.
9.15	369.0	378.	13.15	535.6	549.
9.20	371.1	380.	13.20	537.6	551.
9.25	373.1	382.	13.25	539.7	553.
9.30	375.2	385.	13.30	541.8	555.
9.35	377.3	387.	13.35	543.9	557.
9.40	379.4	389.	13.40	546.0	560.
9.45	381.5	391.	13.45	548.1	562.
9.50	383.6	393.	13.50	550.1	564.
9.55	385.6	395.	13.55	552.2	566.
9.60	387.7	397.	13.60	552.8	567.
9.65	389.8	400.	13.65	552.8	567.
9.70	391.9	402.			
9.75	394.0	404.			
9.80	396.1	406.			
9.85	398.1	408.			
9.90	400.2	410.			
9.95	402.3	412.			
10.00	404.4	414.			
10.05	406.5	417.			
10.10	408.5	419.			
10.15	410.6	421.			
10.20	412.7	423.			
10.25	414.8	425.			
10.30	416.9	427.			
10.35	419.0	429.			
10.40	421.0	432.			
10.45	423.1	434.			
10.50	425.2	436.			
10.55	427.3	438.			
10.60	429.4	440.			
10.65	431.5	442.			
10.70	433.5	444.			
10.75	435.6	447.			
10.80	437.7	449.			
10.85	439.8	451.			
10.90	441.9	453.			
10.95	443.9	455.			
11.00	446.0	457.			
11.05	448.1	459.			
11.10	450.2	461.			
11.15	452.3	464.			
11.20	454.4	466.			
11.25	456.4	468.			
11.30	458.5	470.			
11.35	460.6	472.			
11.40	462.7	474.			
11.45	464.8	476.			
11.50	466.8	479.			
11.55	468.9	481.			
11.60	471.0	483.			
11.65	473.1	485.			
11.70	475.2	487.			
11.75	477.3	489.			
11.80	479.3	491.			
11.85	481.4	493.			
11.90	483.5	496.			
11.95	485.6	498.			

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NO.6 WING W.B.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.3)	0.	4.00	181.7	186.
0.05	0.3	0.	4.05	187.0	192.
0.10	0.4	0.	4.10	192.3	197.
0.15	0.4	0.	4.15	197.7	203.
0.20	0.5	1.	4.20	203.2	208.
0.25	0.7	1.	4.25	208.7	214.
0.30	0.9	1.	4.30	214.3	220.
0.35	1.1	1.	4.35	219.9	225.
0.40	1.3	1.	4.40	225.5	231.
0.45	1.6	2.	4.45	231.2	237.
0.50	2.0	2.	4.50	237.0	243.
0.55	2.3	2.	4.55	242.8	249.
0.60	2.7	3.	4.60	248.7	255.
0.65	3.1	3.	4.65	254.7	261.
0.70	3.5	4.	4.70	260.7	267.
0.75	4.0	4.	4.75	266.7	273.
0.80	4.5	5.	4.80	272.7	279.
0.85	5.1	5.	4.85	278.7	286.
0.90	5.8	6.	4.90	284.7	292.
0.95	6.4	7.	4.95	288.9	296.
1.00	7.2	7.	5.00	291.4	299.
1.05	8.0	8.	5.05	294.0	301.
1.10	8.8	9.	5.10	296.6	304.
1.15	9.7	10.	5.15	299.3	307.
1.20	10.6	11.	5.20	302.0	310.
1.25	11.6	12.	5.25	304.7	312.
1.30	12.6	13.	5.30	307.5	315.
1.35	13.7	14.	5.35	310.2	318.
1.40	14.9	15.	5.40	313.1	321.
1.45	16.1	17.	5.45	315.9	324.
1.50	17.4	18.	5.50	318.7	327.
1.55	18.8	19.	5.55	321.6	330.
1.60	20.2	21.	5.60	324.5	333.
1.65	21.7	22.	5.65	327.5	336.
1.70	23.2	24.	5.70	330.5	339.
1.75	24.8	25.	5.75	333.5	342.
1.80	26.5	27.	5.80	336.5	345.
1.85	28.3	29.	5.85	339.6	348.
1.90	30.1	31.	5.90	342.6	351.
1.95	32.0	33.	5.95	345.7	354.
2.00	34.0	35.	6.00	348.8	358.
2.05	36.1	37.	6.05	351.9	361.
2.10	38.2	39.	6.10	355.1	364.
2.15	40.4	41.	6.15	358.3	367.
2.20	42.7	44.	6.20	361.5	371.
2.25	45.1	46.	6.25	364.7	374.
2.30	47.5	49.	6.30	367.9	377.
2.35	50.0	51.	6.35	371.2	380.
2.40	52.6	54.	6.40	374.4	384.
2.45	55.3	57.	6.45	377.7	387.
2.50	58.1	60.	6.50	381.0	391.
2.55	61.0	63.	6.55	384.3	394.
2.60	64.1	66.	6.60	387.7	397.
2.65	67.4	69.	6.65	391.0	401.
2.70	70.7	72.	6.70	394.4	404.
2.75	74.0	76.	6.75	397.8	408.
2.80	77.3	79.	6.80	401.2	411.
2.85	80.6	83.	6.85	404.6	415
2.90	83.9	86.	6.90	408.0	418
2.95	87.3	89.	6.95	411.4	422.
3.00	90.8	93.	7.00	414.9	425.
3.05	94.6	97.	7.05	418.4	429.
3.10	98.5	101.	7.10	421.8	432.
3.15	102.5	105.	7.15	425.4	436.
3.20	106.5	109.	7.20	428.9	440.
3.25	110.7	113.	7.25	432.4	443.
3.30	114.9	118.	7.30	436.0	447.
3.35	119.2	122.	7.35	439.5	450.
3.40	123.5	127.	7.40	443.0	454.
3.45	128.0	131.	7.45	446.6	458.
3.50	132.5	136.	7.50	450.1	461.
3.55	137.1	141.	7.55	452.2	464.
3.60	141.8	145.	7.60	453.9	465.
3.65	146.6	150.	7.65	455.6	467.
3.70	151.4	155.	7.70	457.2	469.
3.75	156.3	160.	7.75	458.9	470.
3.80	161.3	165.	7.80	460.6	472.
3.85	166.3	170.	7.85	462.3	474.
3.90	171.4	176.	7.90	464.0	476.
3.95	176.5	181.	7.95	465.7	477.

NO.6 WING W.B.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	467.4	479.
8.05	469.1	481.
8.10	470.9	483.
8.15	472.6	484.
8.20	474.4	486.
8.25	476.1	488.
8.30	477.9	490.
8.35	479.7	492.
8.40	481.4	493.
8.45	483.2	495.
8.50	485.0	497.
8.55	486.8	499.
8.60	488.6	501.
8.65	490.4	503.
8.70	492.2	505.
8.75	494.0	506.
8.80	495.9	508.
8.85	497.7	510.
8.90	499.5	512.
8.95	501.3	514.
9.00	503.2	516.
9.05	505.0	518.
9.10	506.9	520.
9.15	508.7	521.
9.20	510.6	523.
9.25	512.4	525.
9.30	514.3	527.
9.35	516.2	529.
9.40	518.0	531.
9.45	519.9	533.
9.50	521.8	535.
9.55	523.6	537.
9.60	525.5	539.
9.65	527.4	541.
9.70	529.3	543.
9.75	531.2	544.
9.80	533.1	546.
9.85	535.0	548.
9.90	536.9	550.
9.95	538.8	552.
10.00	540.7	554.
10.05	542.6	556.
10.10	544.5	558.
10.15	546.4	560.
10.20	548.3	562.
10.25	550.2	564.
10.30	552.1	566.
10.35	554.1	568.
10.40	556.0	570.
10.45	557.9	572.
10.50	559.8	574.
10.55	561.7	576.
10.60	563.6	578.
10.65	565.6	580.
10.70	566.0	580.
10.75	566.0	580.

NO.6 WING W.B.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.3)	0.	4.00	181.2	186.
0.05	0.3	0.	4.05	186.5	191.
0.10	0.4	0.	4.10	191.8	197.
0.15	0.4	0.	4.15	197.2	202.
0.20	0.5	1.	4.20	202.7	208.
0.25	0.7	1.	4.25	208.2	213.
0.30	0.9	1.	4.30	213.7	219.
0.35	1.1	1.	4.35	219.3	225.
0.40	1.3	1.	4.40	225.0	231.
0.45	1.6	2.	4.45	230.7	236.
0.50	1.9	2.	4.50	236.4	242.
0.55	2.3	2.	4.55	242.2	248.
0.60	2.7	3.	4.60	248.1	254.
0.65	3.1	3.	4.65	254.1	260.
0.70	3.5	4.	4.70	260.1	267.
0.75	3.9	4.	4.75	266.1	273.
0.80	4.5	5.	4.80	272.1	279.
0.85	5.1	5.	4.85	278.1	285.
0.90	5.7	6.	4.90	284.1	291.
0.95	6.4	7.	4.95	288.6	296.
1.00	7.1	7.	5.00	291.2	298.
1.05	7.9	8.	5.05	293.7	301.
1.10	8.7	9.	5.10	296.4	304.
1.15	9.6	10.	5.15	299.0	307.
1.20	10.5	11.	5.20	301.7	309.
1.25	11.5	12.	5.25	304.4	312.
1.30	12.5	13.	5.30	307.2	315.
1.35	13.6	14.	5.35	310.0	318.
1.40	14.8	15.	5.40	312.8	321.
1.45	16.0	16.	5.45	315.6	323.
1.50	17.3	18.	5.50	318.5	326.
1.55	18.7	19.	5.55	321.3	329.
1.60	20.1	21.	5.60	324.2	332.
1.65	21.5	22.	5.65	327.2	335.
1.70	23.1	24.	5.70	330.2	338.
1.75	24.7	25.	5.75	333.2	342.
1.80	26.4	27.	5.80	336.2	345.
1.85	28.1	29.	5.85	339.2	348.
1.90	29.9	31.	5.90	342.3	351.
1.95	31.8	33.	5.95	345.4	354.
2.00	33.8	35.	6.00	348.5	357.
2.05	35.9	37.	6.05	351.6	360.
2.10	38.0	39.	6.10	354.8	364.
2.15	40.2	41.	6.15	357.9	367.
2.20	42.5	44.	6.20	361.1	370.
2.25	44.8	46.	6.25	364.4	373.
2.30	47.2	48.	6.30	367.6	377.
2.35	49.8	51.	6.35	370.8	380.
2.40	52.4	54.	6.40	374.1	383.
2.45	55.1	56.	6.45	377.4	387.
2.50	57.9	59.	6.50	380.7	390.
2.55	60.7	62.	6.55	384.0	394.
2.60	63.7	65.	6.60	387.3	397.
2.65	67.1	69.	6.65	390.7	400.
2.70	70.4	72.	6.70	394.1	404.
2.75	73.7	76.	6.75	397.4	407.
2.80	77.0	79.	6.80	400.8	411.
2.85	80.3	82.	6.85	404.2	414.
2.90	83.6	86.	6.90	407.7	418.
2.95	86.9	89.	6.95	411.1	421.
3.00	90.4	93.	7.00	414.5	425.
3.05	94.2	97.	7.05	418.0	428.
3.10	98.1	101.	7.10	421.5	432.
3.15	102.1	105.	7.15	425.0	436.
3.20	106.1	109.	7.20	428.6	439.
3.25	110.3	113.	7.25	432.1	443.
3.30	114.5	117.	7.30	435.6	447.
3.35	118.8	122.	7.35	439.1	450.
3.40	123.1	126.	7.40	442.7	454.
3.45	127.5	131.	7.45	446.2	457.
3.50	132.0	135.	7.50	449.7	461.
3.55	136.6	140.	7.55	452.1	463.
3.60	141.3	145.	7.60	453.8	465.
3.65	146.1	150.	7.65	455.4	467.
3.70	150.9	155.	7.70	457.1	469.
3.75	155.8	160.	7.75	458.8	470.
3.80	160.8	165.	7.80	460.5	472.
3.85	165.8	170.	7.85	462.2	474.
3.90	170.9	175.	7.90	463.9	475.
3.95	176.0	180.	7.95	465.6	477.

NO.6 WING W.B.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	467.3	479.
8.05	469.0	481.
8.10	470.7	482.
8.15	472.5	484.
8.20	474.2	486.
8.25	476.0	488.
8.30	477.7	490.
8.35	479.5	491.
8.40	481.3	493.
8.45	483.0	495.
8.50	484.8	497.
8.55	486.6	499.
8.60	488.4	501.
8.65	490.2	502.
8.70	492.0	504.
8.75	493.8	506.
8.80	495.6	508.
8.85	497.4	510.
8.90	499.2	512.
8.95	501.1	514.
9.00	502.9	515.
9.05	504.7	517.
9.10	506.6	519.
9.15	508.4	521.
9.20	510.2	523.
9.25	512.1	525.
9.30	514.0	527.
9.35	515.8	529.
9.40	517.7	531.
9.45	519.5	533.
9.50	521.4	534.
9.55	523.2	536.
9.60	525.1	538.
9.65	527.0	540.
9.70	528.9	542.
9.75	530.8	544.
9.80	532.7	546.
9.85	534.6	548.
9.90	536.5	550.
9.95	538.4	552.
10.00	540.3	554.
10.05	542.2	556.
10.10	544.1	558.
10.15	546.0	560.
10.20	547.9	562.
10.25	549.9	564.
10.30	551.8	566.
10.35	553.7	568.
10.40	555.6	569.
10.45	557.5	571.
10.50	559.4	573.
10.55	561.3	575.
10.60	563.3	577.
10.65	565.2	579.
10.70	566.0	580.
10.75	566.0	580.

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AFT PEAK TANK (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.1)	0.	1.60	7.3	7.
0.02	0.1	0.	1.62	7.7	8.
0.04	0.1	0.	1.64	8.1	8.
0.06	0.2	0.	1.66	8.5	9.
0.08	0.2	0.	1.68	8.9	9.
0.10	0.2	0.	1.70	9.3	10.
0.12	0.2	0.	1.72	9.8	10.
0.14	0.3	0.	1.74	10.3	11.
0.16	0.3	0.	1.76	10.8	11.
0.18	0.3	0.	1.78	11.3	12.
0.20	0.3	0.	1.80	11.8	12.
0.22	0.3	0.	1.82	12.3	13.
0.24	0.4	0.	1.84	12.9	13.
0.26	0.4	0.	1.86	13.5	14.
0.28	0.4	0.	1.88	14.1	14.
0.30	0.4	0.	1.90	14.7	15.
0.32	0.5	0.	1.92	15.4	16.
0.34	0.5	1.	1.94	16.1	16.
0.36	0.5	1.	1.96	16.7	17.
0.38	0.6	1.	1.98	17.4	18.
0.40	0.6	1.	2.00	18.2	19.
0.42	0.6	1.	2.02	18.9	19.
0.44	0.6	1.	2.04	19.7	20.
0.46	0.7	1.	2.06	20.5	21.
0.48	0.7	1.	2.08	21.3	22.
0.50	0.7	1.	2.10	22.1	23.
0.52	0.8	1.	2.12	23.0	24.
0.54	0.8	1.	2.14	23.9	24.
0.56	0.8	1.	2.16	24.8	25.
0.58	0.9	1.	2.18	25.7	26.
0.60	0.9	1.	2.20	26.7	27.
0.62	0.9	1.	2.22	27.7	28.
0.64	0.9	1.	2.24	28.7	29.
0.66	1.0	1.	2.26	29.7	30.
0.68	1.0	1.	2.28	30.7	32.
0.70	1.0	1.	2.30	31.8	33.
0.72	1.1	1.	2.32	32.9	34.
0.74	1.1	1.	2.34	34.1	35.
0.76	1.1	1.	2.36	35.2	36.
0.78	1.2	1.	2.38	36.4	37.
0.80	1.2	1.	2.40	37.7	39.
0.82	1.3	1.	2.42	39.0	40.
0.84	1.3	1.	2.44	40.2	41.
0.86	1.3	1.	2.46	41.5	43.
0.88	1.4	1.	2.48	42.8	44.
0.90	1.4	1.	2.50	44.1	45.
0.92	1.5	2.	2.52	45.3	46.
0.94	1.5	2.	2.54	46.7	48.
0.96	1.6	2.	2.56	48.1	49.
0.98	1.6	2.	2.58	49.6	51.
1.00	1.7	2.	2.60	51.0	52.
1.02	1.8	2.	2.62	52.5	54.
1.04	1.9	2.	2.64	54.0	55.
1.06	2.0	2.	2.66	55.6	57.
1.08	2.1	2.	2.68	57.1	59.
1.10	2.2	2.	2.70	58.7	60.
1.12	2.2	2.	2.72	60.3	62.
1.14	2.3	2.	2.74	61.9	63.
1.16	2.4	3.	2.76	63.6	65.
1.18	2.5	3.	2.78	65.3	67.
1.20	2.6	3.	2.80	67.0	69.
1.22	2.8	3.	2.82	68.7	70.
1.24	2.9	3.	2.84	70.5	72.
1.26	3.0	3.	2.86	72.3	74.
1.28	3.2	3.	2.88	74.1	76.
1.30	3.4	3.	2.90	75.9	78.
1.32	3.6	4.	2.92	77.8	80.
1.34	3.8	4.	2.94	79.7	82.
1.36	3.9	4.	2.96	81.6	84.
1.38	4.1	4.	2.98	83.5	86.
1.40	4.4	4.	3.00	85.5	88.
1.42	4.6	5.	3.02	87.5	90.
1.44	4.8	5.	3.04	89.5	92.
1.46	5.1	5.	3.06	91.6	94.
1.48	5.4	6.	3.08	93.7	96.
1.50	5.6	6.	3.10	95.9	98.
1.52	5.9	6.	3.12	98.0	100.
1.54	6.2	6.	3.14	100.1	103.
1.56	6.6	7.	3.16	102.2	105.
1.58	6.9	7.	3.18	104.3	107.

AFT PEAK TANK (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
3.20	106.5	109.	4.80	333.4	342.
3.22	108.7	111.	4.82	337.0	345.
3.24	111.0	114.	4.84	340.6	349.
3.26	113.2	116.	4.86	344.2	353.
3.28	115.5	118.	4.88	347.8	356.
3.30	117.9	121.	4.90	351.4	360.
3.32	120.2	123.	4.92	355.0	364.
3.34	122.6	126.	4.94	358.7	368.
3.36	125.0	128.	4.96	362.3	371.
3.38	127.4	131.	4.98	366.0	375.
3.40	129.8	133.	5.00	369.6	379.
3.42	132.3	136.	5.02	373.3	383.
3.44	134.8	138.	5.04	377.0	386.
3.46	137.3	141.	5.06	380.7	390.
3.48	139.9	143.	5.08	384.4	394.
3.50	142.4	146.	5.10	388.1	398.
3.52	145.0	149.	5.12	391.9	402.
3.54	147.6	151.	5.14	395.6	406.
3.56	150.3	154.	5.16	399.4	409.
3.58	153.0	157.	5.18	403.1	413.
3.60	155.6	160.	5.20	406.9	417.
3.62	158.4	162.	5.22	410.7	421.
3.64	161.1	165.	5.24	414.5	425.
3.66	163.8	168.	5.26	418.3	429.
3.68	166.6	171.	5.28	422.0	433.
3.70	169.4	174.	5.30	425.8	436.
3.72	172.2	177.	5.32	429.6	440.
3.74	175.1	179.	5.34	433.4	444.
3.76	178.0	182.	5.36	437.2	448.
3.78	180.9	185.	5.38	441.0	452.
3.80	183.8	188.	5.40	442.3	453.
3.82	186.7	191.	5.42	442.3	453.
3.84	189.7	194.	5.44	442.3	453.
3.86	192.7	197.	5.46	442.3	453.
3.88	195.7	201.	5.48	442.3	453.
3.90	198.7	204.	5.50	442.3	453.
3.92	201.8	207.	5.52	442.3	453.
3.94	204.9	210.	5.54	442.3	453.
3.96	208.0	213.	5.56	442.3	453.
3.98	211.1	216.	5.58	442.3	453.
4.00	214.2	220.			
4.02	216.7	222.			
4.04	219.2	225.			
4.06	221.7	227.			
4.08	224.3	230.			
4.10	226.9	233.			
4.12	229.5	235.			
4.14	232.1	238.			
4.16	23[illegible]	241.			
4.18	237.5	243.			
4.20	240.2	246.			
4.22	242.9	249.			
4.24	245.6	252.			
4.26	248.4	255.			
4.28	251.2	257.			
4.30	254.0	260.			
4.32	256.8	263.			
4.34	259.6	266.			
4.36	262.5	269.			
4.38	265.4	272.			
4.40	268.3	275.			
4.42	271.3	278.			
4.44	274.2	281.			
4.46	277.1	284.			
4.48	280.1	287.			
4.50	283.1	290.			
4.52	286.2	293.			
4.54	289.2	296.			
4.56	292.2	300.			
4.58	295.3	303.			
4.60	298.6	306.			
4.62	302.0	310.			
4.64	305.5	313.			
4.66	308.9	317.			
4.68	312.4	320.			
4.70	315.9	324.			
4.72	319.3	327.			
4.74	322.8	331.			
4.76	326.4	335.			
4.78	329.9	338.			

AFT PEAK TANK (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.1)	0.	1.60	7.3	7.
0.02	0.1	0.	1.62	7.7	8.
0.04	0.1	0.	1.64	8.1	8.
0.06	0.2	0.	1.66	8.5	9.
0.08	0.2	0.	1.68	8.9	9.
0.10	0.2	0.	1.70	9.3	10.
0.12	0.2	0.	1.72	9.8	10.
0.14	0.3	0.	1.74	10.3	11.
0.16	0.3	0.	1.76	10.8	11.
0.18	0.3	0.	1.78	11.3	12.
0.20	0.3	0.	1.80	11.8	12.
0.22	0.3	0.	1.82	12.3	13.
0.24	0.4	0.	1.84	12.9	13.
0.26	0.4	0.	1.86	13.5	14.
0.28	0.4	0.	1.88	14.1	14.
0.30	0.4	0.	1.90	14.7	15.
0.32	0.5	0.	1.92	15.4	16.
0.34	0.5	1.	1.94	16.1	16.
0.36	0.5	1.	1.96	16.7	17.
0.38	0.6	1.	1.98	17.4	18.
0.40	0.6	1.	2.00	18.2	19.
0.42	0.6	1.	2.02	18.9	19.
0.44	0.6	1.	2.04	19.7	20.
0.46	0.7	1.	2.06	20.5	21.
0.48	0.7	1.	2.08	21.3	22.
0.50	0.7	1.	2.10	22.1	23.
0.52	0.8	1.	2.12	23.0	24.
0.54	0.8	1.	2.14	23.9	24.
0.56	0.8	1.	2.16	24.8	25.
0.58	0.9	1.	2.18	25.7	26.
0.60	0.9	1.	2.20	26.7	27.
0.62	0.9	1.	2.22	27.7	28.
0.64	0.9	1.	2.24	28.7	29.
0.66	1.0	1.	2.26	29.7	30.
0.68	1.0	1.	2.28	30.7	32.
0.70	1.0	1.	2.30	31.8	33.
0.72	1.1	1.	2.32	32.9	34.
0.74	1.1	1.	2.34	34.1	35.
0.76	1.1	1.	2.36	35.2	36.
0.78	1.2	1.	2.38	36.4	37.
0.80	1.2	1.	2.40	37.7	39.
0.82	1.3	1.	2.42	39.0	40.
0.84	1.3	1.	2.44	40.2	41.
0.86	1.3	1.	2.46	41.5	43.
0.88	1.4	1.	2.48	42.8	44.
0.90	1.4	1.	2.50	44.1	45.
0.92	1.5	2.	2.52	45.3	46.
0.94	1.5	2.	2.54	46.7	48.
0.96	1.6	2.	2.56	48.1	49.
0.98	1.6	2.	2.58	49.6	51.
1.00	1.7	2.	2.60	51.0	52.
1.02	1.8	2.	2.62	52.5	54.
1.04	1.9	2.	2.64	54.0	55.
1.06	2.0	2.	2.66	55.6	57.
1.08	2.1	2.	2.68	57.1	59.
1.10	2.2	2.	2.70	58.7	60.
1.12	2.2	2.	2.72	60.3	62.
1.14	2.3	2.	2.74	61.9	63.
1.16	2.4	3.	2.76	63.6	65.
1.18	2.5	3.	2.78	65.3	67.
1.20	2.6	3.	2.80	67.0	69.
1.22	2.8	3.	2.82	68.7	70.
1.24	2.9	3.	2.84	70.5	72.
1.26	3.0	3.	2.86	72.3	74.
1.28	3.2	3.	2.88	74.1	76.
1.30	3.4	3.	2.90	76.0	78.
1.32	3.6	4.	2.92	77.9	80.
1.34	3.8	4.	2.94	79.8	82.
1.36	3.9	4.	2.96	81.7	84.
1.38	4.1	4.	2.98	83.7	86.
1.40	4.4	4.	3.00	85.7	88.
1.42	4.6	5.	3.02	87.7	90.
1.44	4.8	5.	3.04	89.8	92.
1.46	5.1	5.	3.06	92.0	94.
1.48	5.4	6.	3.08	94.2	97.
1.50	5.6	6.	3.10	96.3	99.
1.52	5.9	6.	3.12	98.5	101.
1.54	6.2	6.	3.14	100.7	103.
1.56	6.6	7.	3.16	102.8	105.
1.58	6.9	7.	3.18	105.0	108.

AFT PEAK TANK (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
3.20	107.3	110.	4.80	339.9	348.
3.22	109.6	112.	4.82	343.5	352.
3.24	111.9	115.	4.84	347.2	356.
3.26	114.2	117.	4.86	350.8	360.
3.28	116.5	119.	4.88	354.5	363.
3.30	118.9	122.	4.90	358.2	367.
3.32	121.3	124.	4.92	361.9	371.
3.34	123.7	127.	4.94	365.6	375.
3.36	126.2	129.	4.96	369.3	379.
3.38	128.7	132.	4.98	373.0	382.
3.40	131.2	134.	5.00	376.8	386.
3.42	133.7	137.	5.02	380.6	390.
3.44	136.2	140.	5.04	384.3	394.
3.46	138.8	142.	5.06	388.1	398.
3.48	141.4	145.	5.08	391.9	402.
3.50	144.0	148.	5.10	395.6	406.
3.52	146.7	150.	5.12	399.5	409.
3.54	149.4	153.	5.14	403.3	413.
3.56	152.1	156.	5.16	407.1	417.
3.58	154.8	159.	5.18	410.9	421.
3.60	157.5	161.	5.20	414.7	425.
3.62	160.3	164.	5.22	418.6	429.
3.64	163.1	167.	5.24	422.4	433.
3.66	165.9	170.	5.26	426.3	437.
3.68	168.7	173.	5.28	430.1	441.
3.70	171.6	176.	5.30	434.0	445.
3.72	174.5	179.	5.32	437.8	449.
3.74	177.4	182.	5.34	441.7	453.
3.76	180.3	185.	5.36	445.5	457.
3.78	183.3	188.	5.38	449.4	461.
3.80	186.3	191.	5.40	450.7	462.
3.82	189.3	194.	5.42	450.7	462.
3.84	192.3	197.	5.44	450.7	462.
3.86	195.4	200.			
3.88	198.5	203.			
3.90	201.6	207.			
3.92	204.7	210.			
3.94	207.9	213.			
3.96	211.1	216.			
3.98	214.3	220.			
4.00	217.5	223.			
4.02	220.1	226.			
4.04	222.7	228.			
4.06	225.3	231.			
4.08	227.9	234.			
4.10	230.6	236.			
4.12	233.3	239.			
4.14	236.0	242.			
4.16	238.7	245.			
4.18	241.5	248.			
4.20	244.3	250.			
4.22	247.1	253.			
4.24	249.9	256.			
4.26	252.7	259.			
4.28	255.6	262.			
4.30	258.5	265.			
4.32	261.4	268.			
4.34	264.3	271.			
4.36	267.2	274.			
4.38	270.2	277.			
4.40	273.2	280.			
4.42	276.2	283.			
4.44	279.2	286.			
4.46	282.3	289.			
4.48	285.3	292.			
4.50	288.4	296.			
4.52	291.5	299.			
4.54	294.6	302.			
4.56	297.7	305.			
4.58	300.9	308.			
4.60	304.2	312.			
4.62	307.8	315.			
4.64	311.3	319.			
4.66	314.8	323.			
4.68	318.3	326.			
4.70	321.9	330.			
4.72	325.5	334.			
4.74	329.1	337.			
4.76	332.6	341.			
4.78	336.3	345.			

ANTI-HEELING TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (1.9)	0 (2.)	4.00	213.3	219.
0.05	4.1	4.	4.05	215.2	221.
0.10	6.2	6.	4.10	217.2	223.
0.15	8.4	9.	4.15	219.2	225.
0.20	10.7	11.	4.20	221.1	227.
0.25	13.0	13.	4.25	223.1	229.
0.30	15.4	16.	4.30	225.1	231.
0.35	17.9	18.	4.35	227.1	233.
0.40	20.4	21.	4.40	229.1	235.
0.45	22.9	23.	4.45	231.1	237.
0.50	25.5	26.	4.50	233.1	239.
0.55	28.1	29.	4.55	235.1	241.
0.60	30.7	32.	4.60	237.1	243.
0.65	33.4	34.	4.65	239.1	245.
0.70	36.2	37.	4.70	241.1	247.
0.75	38.9	40.	4.75	243.2	249.
0.80	41.8	43.	4.80	245.2	251.
0.85	44.7	46.	4.85	247.2	253.
0.90	47.6	49.	4.90	249.2	255.
0.95	50.5	52.	4.95	251.3	258.
1.00	53.5	55.	5.00	253.3	260.
1.05	56.5	58.	5.05	255.3	262.
1.10	59.5	61.	5.10	257.4	264.
1.15	62.6	64.	5.15	259.4	266.
1.20	65.7	67.	5.20	261.4	268.
1.25	68.8	71.	5.25	263.5	270.
1.30	72.0	74.	5.30	265.5	272.
1.35	75.2	77.	5.35	267.6	274.
1.40	78.4	80.	5.40	269.6	276.
1.45	81.7	84.	5.45	271.7	278.
1.50	85.0	87.	5.50	273.7	281.
1.55	88.3	90.	5.55	275.8	283.
1.60	91.6	94.	5.60	277.8	285.
1.65	94.9	97.	5.65	279.9	287.
1.70	98.3	101.	5.70	281.9	289.
1.75	101.7	104.	5.75	284.0	291.
1.80	105.1	108.	5.80	286.0	293.
1.85	108.6	111.	5.85	288.1	295.
1.90	112.1	115.	5.90	290.1	297.
1.95	115.6	118.	5.95	292.2	299.
2.00	119.1	122.	6.00	294.2	302.
2.05	122.6	126.	6.05	296.3	304.
2.10	126.2	129.	6.10	298.4	306.
2.15	129.8	133.	6.15	300.4	308.
2.20	133.3	137.	6.20	302.5	310.
2.25	137.0	140.	6.25	304.5	312.
2.30	140.6	144.	6.30	306.6	314.
2.35	144.3	148.	6.35	308.6	316.
2.40	148.0	152.	6.40	310.7	318.
2.45	151.7	155.	6.45	312.7	321.
2.50	155.3	159.	6.50	314.8	323.
2.55	159.0	163.	6.55	316.9	325.
2.60	161.7	166.	6.60	318.9	327.
2.65	163.4	167.	6.65	321.0	329.
2.70	165.1	169.	6.70	323.0	331.
2.75	166.8	171.	6.75	325.1	333.
2.80	168.5	173.	6.80	327.1	335.
2.85	170.3	175.	6.85	329.2	337.
2.90	172.1	176.	6.90	331.[illegible]	340.
2.95	173.8	178.	6.95	333.3	342.
3.00	175.6	180.	7.00	335.3	344.
3.05	177.4	182.	7.05	337.4	346.
3.10	179.2	184.	7.10	339.4	348.
3.15	181.0	186.	7.15	341.5	350.
3.20	182.8	187.	7.20	343.6	352.
3.25	184.7	189.	7.25	345.6	354.
3.30	186.5	191.	7.30	347.7	356.
3.35	188.4	193.	7.35	349.7	358.
3.40	190.3	195.	7.40	351.8	361.
3.45	192.1	197.	7.45	353.8	363.
3.50	194.0	199.	7.50	355.9	365.
3.55	195.9	201.	7.55	357.9	367.
3.60	197.8	203.	7.60	360.0	369.
3.65	199.7	205.	7.65	362.0	371.
3.70	201.6	207.	7.70	364.1	373.
3.75	203.6	209.	7.75	366.1	375.
3.80	205.5	211.	7.80	368.2	377.
3.85	207.4	213.	7.85	370.2	379.
3.90	209.4	215.	7.90	372.3	382.
3.95	211.3	217.	7.95	374.3	384.

ANTI-HEELING TK. (P OR S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
8.00	376.4	386.	12.00	540.6	554.
8.05	378.5	388.	12.05	542.7	556.
8.10	380.5	390.	12.10	544.7	558.
8.15	382.6	392.	12.15	546.8	560.
8.20	384.6	394.	12.20	548.8	563.
8.25	386.7	396.	12.25	550.9	565.
8.30	388.7	398.	12.30	552.9	567.
8.35	390.8	401.	12.35	555.0	569.
8.40	392.8	403.	12.40	557.1	571.
8.45	394.9	405.	12.45	559.1	573.
8.50	396.9	407.	12.50	561.2	575.
8.55	399.0	409.	12.55	563.2	577.
8.60	401.0	411.	12.60	565.3	579.
8.65	403.1	413.	12.65	567.3	581.
8.70	405.1	415.	12.70	569.4	584.
8.75	407.2	417.	12.75	571.4	586.
8.80	409.2	419.	12.80	573.5	588.
8.85	411.3	422.	12.85	575.5	590.
8.90	413.4	424.	12.90	577.6	592.
8.95	415.4	426.	12.95	579.6	594.
9.00	417.5	428.	13.00	581.7	596.
9.05	419.5	430.	13.05	583.7	598.
9.10	421.6	432.	13.10	585.7	600.
9.15	423.6	434.	13.15	587.7	602.
9.20	425.7	436.	13.20	589.8	604.
9.25	427.7	438.	13.25	591.8	607.
9.30	429.8	441.	13.30	593.8	609.
9.35	431.8	443.	13.35	595.8	611.
9.40	433.9	445.	13.40	597.9	613.
9.45	435.9	447.	13.45	599.9	615.
9.50	438.0	449.	13.50	600.9	616.
9.55	440.0	451.	13.55	600.9	616.
9.60	442.1	453.			
9.65	444.1	455.			
9.70	446.2	457.			
9.75	448.3	459.			
9.80	450.3	462.			
9.85	452.4	464.			
9.90	454.4	466.			
9.95	456.5	468.			
10.00	458.5	470.			
10.05	460.6	472.			
10.10	462.6	474.			
10.15	464.7	476.			
10.20	466.7	478.			
10.25	468.8	481.			
10.30	470.8	483.			
10.35	472.9	485.			
10.40	474.9	487.			
10.45	477.0	489.			
10.50	479.0	491.			
10.55	481.1	493.			
10.60	483.1	495.			
10.65	485.2	497.			
10.70	487.3	499.			
10.75	489.3	502.			
10.80	491.4	504.			
10.85	493.4	506.			
10.90	495.5	508.			
10.95	497.5	510.			
11.00	499.6	512.			
11.05	501.6	514.			
11.10	503.7	516.			
11.15	505.7	518.			
11.20	507.8	520.			
11.25	509.8	523.			
11.30	511.9	525.			
11.35	513.9	527.			
11.40	516.0	529.			
11.45	518.0	531.			
11.50	520.1	533.			
11.55	522.2	535.			
11.60	524.2	537.			
11.65	526.3	539.			
11.70	528.3	542.			
11.75	530.4	544.			
11.80	532.4	546.			
11.85	534.5	548.			
11.90	536.5	550.			
11.95	538.6	552.			

DIST.WATER TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)	SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
0.0	0.0 (0.1)	0.	1.60	13.7	14.
0.02	0.3	0.	1.62	13.9	14.
0.04	0.5	0.	1.64	14.1	14.
0.06	0.6	1.	1.66	14.3	14.
0.08	0.8	1.	1.68	14.4	14.
0.10	1.0	1.	1.70	14.6	15.
0.12	1.1	1.	1.72	14.8	15.
0.14	1.3	1.	1.74	14.9	15.
0.16	1.5	1.	1.76	15.1	15.
0.18	1.6	2.	1.78	15.3	15.
0.20	1.8	2.	1.80	15.4	15.
0.22	2.0	2.	1.82	15.6	16.
0.24	2.1	2.	1.84	15.8	16.
0.26	2.3	2.	1.86	16.0	16.
0.28	2.5	2.	1.88	16.1	16.
0.30	2.7	3.	1.90	16.3	16.
0.32	2.8	3.	1.92	16.5	16.
0.34	3.0	3.	1.94	16.6	17.
0.36	3.2	3.	1.96	16.8	17.
0.38	3.3	3.	1.98	17.0	17.
0.40	3.5	4.	2.00	17.2	17.
0.42	3.7	4.	2.02	17.3	17.
0.44	3.8	4.	2.04	17.5	18.
0.46	4.0	4.	2.06	17.7	18.
0.48	4.2	4.	2.08	17.8	18.
0.50	4.3	4.	2.10	18.0	18.
0.52	4.5	5.	2.12	18.2	18.
0.54	4.7	5.	2.14	18.4	18.
0.56	4.9	5.	2.16	18.5	19.
0.58	5.0	5.	2.18	18.7	19.
0.60	5.2	5.	2.20	18.9	19.
0.62	5.4	5.	2.22	19.0	19.
0.64	5.5	6.	2.24	19.2	19.
0.66	5.7	6.	2.26	19.4	19.
0.68	5.9	6.	2.28	19.6	20.
0.70	6.0	6.	2.30	19.7	20.
0.72	6.2	6.	2.32	19.9	20.
0.74	6.4	6.	2.34	20.1	20.
0.76	6.6	7.	2.36	20.2	20.
0.78	6.7	7.	2.38	20.4	20.
0.80	6.9	7.	2.40	20.6	21.
0.82	7.1	7.	2.42	20.7	21.
0.84	7.2	7.	2.44	20.9	21.
0.86	7.4	7.	2.46	21.1	21.
0.88	7.6	8.	2.48	21.3	21.
0.90	7.8	8.	2.50	21.4	21.
0.92	7.9	8.	2.52	21.6	22.
0.94	8.1	8.	2.54	21.8	22.
0.96	8.3	8.	2.56	22.0	22.
0.98	8.4	8.	2.58	22.1	22.
1.00	8.6	9.	2.60	22.3	22.
1.02	8.8	9.	2.62	22.5	22.
1.04	9.0	9.	2.64	22.6	23.
1.06	9.1	9.	2.66	22.8	23.
1.08	9.3	9.	2.68	23.0	23.
1.10	9.5	9.	2.70	23.1	23.
1.12	9.6	10.	2.72	23.3	23.
1.14	9.8	10.	2.74	23.5	23.
1.16	10.0	10.	2.76	23.7	24.
1.18	10.1	10.	2.78	23.8	24.
1.20	10.3	10.	2.80	24.0	24.
1.22	10.5	10.	2.82	24.2	24.
1.24	10.7	11.	2.84	24.3	24.
1.26	10.8	11.	2.86	24.5	25.
1.28	11.0	11.	2.88	24.7	25.
1.30	11.2	11.	2.90	24.9	25.
1.32	11.3	11.	2.92	25.0	25.
1.34	11.5	12.	2.94	25.2	25.
1.36	11.7	12.	2.96	25.4	25.
1.38	11.9	12.	2.98	25.5	26.
1.40	12.0	12.	3.00	25.7	26.
1.42	12.2	12.	3.02	25.9	26.
1.44	12.4	12.	3.04	26.1	26.
1.46	12.5	13.	3.06	26.2	26.
1.48	12.7	13.	3.08	26.4	26.
1.50	12.9	13.	3.10	26.6	27.
1.52	13.1	13.	3.12	26.7	27.
1.54	13.2	13.	3.14	26.9	27.
1.56	13.4	13.	3.16	27.1	27.
1.58	13.6	14.	3.18	27.3	27.

DIST.WATER TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	WEIGHT (MT)
3.20	27.4	27.
3.22	27.6	28.
3.24	27.8	28.
3.26	27.9	28.
3.28	28.1	28.
3.30	28.3	28.
3.32	28.5	28.
3.34	28.6	29.
3.36	28.8	29.
3.38	29.0	29.
3.40	29.1	29.
3.42	29.3	29.
3.44	29.5	29.
3.46	29.6	30.
3.48	29.8	30.
3.50	30.0	30.
3.52	30.2	30.
3.54	30.3	30.
3.56	30.5	30.
3.58	30.6	31.
3.60	30.6	31.

COOL.W.TK.

SOUND DEPTH (M)	(CUB.M)	WEIGHT (MT)
0.0	0.0 (0.2)	0.
0.10	0.5	1.
0.20	0.9	1.
0.30	1.3	1.
0.40	1.8	2.
0.50	2.3	2.
0.60	2.8	3.
0.70	3.3	3.
0.80	3.9	4.
0.90	4.5	5.
1.00	5.1	5.
1.10	5.8	6.
1.20	6.5	6.
1.30	7.2	7.
1.40	7.9	8.
1.50	8.7	9.
1.60	9.5	9.
1.70	10.3	10.
1.80	11.1	11.
1.90	12.0	12.
2.00	12.9	13.
2.10	13.8	14.
2.20	14.7	15.
2.30	15.6	16.
2.40	16.6	17.
2.50	17.6	18.
2.60	18.6	19.
2.70	19.7	20.
2.80	20.7	21.
2.90	21.8	22.
3.00	23.0	23.
3.10	24.1	24.
3.20	25.3	25.
3.30	26.6	27.
3.40	28.0	28.
3.50	29.5	30.
3.60	31.1	31.
3.70	32.5	32.
3.80	33.7	34.
3.90	34.8	35.
4.00	36.0	36.
4.10	37.1	37.
4.20	38.3	38.
4.30	39.4	39.
4.40	40.5	41.
4.50	41.7	42.
4.60	42.9	43.
4.70	44.4	44.
4.80	46.1	46.
4.90	47.7	48.
5.00	49.2	49.
5.10	50.6	51.
5.20	51.9	52.
5.30	53.2	53.
5.40	54.5	55.
5.50	55.8	56.
5.60	57.1	57.
5.70	58.4	58.
5.80	59.6	60.
5.90	60.9	61.
6.00	62.1	62.
6.10	63.3	63.
6.20	64.5	65.
6.30	65.7	66.
6.40	66.9	67.
6.50	68.1	68.
6.60	69.2	69.
6.70	70.4	70.
6.80	71.5	72.
6.90	72.7	73.
7.00	73.8	74.
7.10	74.9	75.
7.20	76.0	76.
7.30	77.2	77.
7.40	78.3	78.
7.50	79.4	79.
7.60	80.6	81.
7.70	81.7	82.
7.80	82.8	83.
7.90	84.0	84.

SOUND DEPTH (M)	(CUB.M)	WEIGHT (MT)
8.00	85.1	85.
8.10	86.3	86.
8.20	87.3	87.
8.30	88.2	88.
8.40	89.1	89.
8.50	89.8	90.
8.60	90.1	90.
8.70	90.1	90.
8.80	90.1	90.

NO.3 F.WING F.O.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
0.0	0.0 (2.0)	0 (12.)	15.345
0.05	3.4	21.	15.295
0.10	4.7	30.	15.245
0.15	6.1	39.	15.195
0.20	7.5	47.	15.145
0.25	8.9	56.	15.095
0.30	10.4	65.	15.045
0.35	11.9	75.	14.995
0.40	13.3	84.	14.945
0.45	14.8	93.	14.895
0.50	16.3	103.	14.845
0.55	17.8	112.	14.795
0.60	19.3	122.	14.745
0.65	20.8	131.	14.695
0.70	22.4	141.	14.645
0.75	23.9	150.	14.595
0.80	25.4	160.	14.545
0.85	27.0	170.	14.495
0.90	28.5	179.	14.445
0.95	30.1	189.	14.395
1.00	31.7	199.	14.345
1.05	33.3	209.	14.295
1.10	34.9	219.	14.245
1.15	36.4	229.	14.195
1.20	38.0	239.	14.145
1.25	39.6	249.	14.095
1.30	41.2	259.	14.045
1.35	42.8	269.	13.995
1.40	44.4	279.	13.945
1.45	46.0	289.	13.895
1.50	47.6	300.	13.845
1.55	49.2	310.	13.795
1.60	50.9	320.	13.745
1.65	52.5	330.	13.695
1.70	54.1	340.	13.645
1.75	55.7	350.	13.595
1.80	57.3	360.	13.545
1.85	58.9	370.	13.495
1.90	60.5	381.	13.445
1.95	62.1	391.	13.395
2.00	63.7	401.	13.345
2.05	65.3	411.	13.295
2.10	66.9	421.	13.245
2.15	68.5	431.	13.195
2.20	70.1	441.	13.145
2.25	71.7	451.	13.095
2.30	73.3	461.	13.045
2.35	74.9	471.	12.995
2.40	76.4	481.	12.945
2.45	78.0	491.	12.895
2.50	79.6	500.	12.845
2.55	81.1	510.	12.795
2.60	82.7	520.	12.745
2.65	84.2	529.	12.695
2.70	85.7	539.	12.645
2.75	87.2	549.	12.595
2.80	88.8	558.	12.545
2.85	90.3	568.	12.495
2.90	91.8	578.	12.445
2.95	93.3	587.	12.395
3.00	94.8	596.	12.345
3.05	96.3	606.	12.295
3.10	97.8	615.	12.245
3.15	99.3	624.	12.195
3.20	100.7	633.	12.145
3.25	102.2	643.	12.095
3.30	103.6	652.	12.045
3.35	105.1	661.	11.995
3.40	106.5	670.	11.945
3.45	107.9	679.	11.895
3.50	109.4	688.	11.845
3.55	110.8	697.	11.795
3.60	112.2	706.	11.745
3.65	113.6	714.	11.695
3.70	115.0	723.	11.645
3.75	116.4	732.	11.595
3.80	117.8	741.	11.545
3.85	119.2	749.	11.495
3.90	120.6	758.	11.445
3.95	121.9	767.	11.395

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
4.00	123.3	776.	11.345
4.05	124.7	784.	11.295
4.10	126.1	793.	11.245
4.15	127.4	801.	11.195
4.20	128.8	810.	11.145
4.25	130.2	819.	11.095
4.30	131.5	827.	11.045
4.35	132.9	836.	10.995
4.40	134.2	844.	10.945
4.45	135.6	853.	10.895
4.50	137.0	861.	10.845
4.55	138.3	870.	10.795
4.60	139.7	878.	10.745
4.65	141.0	887.	10.695
4.70	142.4	896.	10.645
4.75	143.8	904.	10.595
4.80	145.1	913.	10.545
4.85	146.5	921.	10.495
4.90	147.8	930.	10.445
4.95	149.2	938.	10.395
5.00	150.6	947.	10.345
5.05	151.9	955.	10.295
5.10	153.3	964.	10.245
5.15	154.7	973.	10.195
5.20	156.0	981.	10.145
5.25	157.4	990.	10.095
5.30	158.8	999.	10.045
5.35	160.2	1007.	9.995
5.40	161.6	1016.	9.945
5.45	163.0	1025.	9.895
5.50	164.4	1034.	9.845
5.55	165.8	1043.	9.795
5.60	167.2	1051.	9.745
5.65	168.6	1060.	9.695
5.70	170.0	1069.	9.645
5.75	171.4	1078.	9.595
5.80	172.9	1087.	9.545
5.85	174.3	1096.	9.495
5.90	175.7	1105.	9.445
5.95	177.2	1114.	9.395
6.00	178.6	1123.	9.345
6.05	180.1	1133.	9.295
6.10	181.5	1142.	9.245
6.15	183.0	1151.	9.195
6.20	184.5	1160.	9.145
6.25	185.9	1169.	9.095
6.30	187.4	1179.	9.045
6.35	188.9	1188.	8.995
6.40	190.5	1198.	8.945
6.45	192.2	1208.	8.895
6.50	193.9	1219.	8.845
6.55	195.6	1230.	8.795
6.60	197.3	1241.	8.745
6.65	199.0	1251.	8.695
6.70	200.7	1262.	8.645
6.75	202.4	1273.	8.595
6.80	204.1	1284.	8.545
6.85	205.9	1295.	8.495
6.90	207.6	1306.	8.445
6.95	209.3	1316.	8.395
7.00	211.0	1327.	8.345
7.05	212.8	1338.	8.295
7.10	214.5	1349.	8.245
7.15	216.3	1360.	8.195
7.20	218.0	1371.	8.145
7.25	219.7	1382.	8.095
7.30	221.5	1393.	8.045
7.35	223.2	1404.	7.995
7.40	225.0	1415.	7.945
7.45	226.7	1426.	7.895
7.50	228.5	1437.	7.845
7.55	230.2	1448.	7.795
7.60	232.0	1459.	7.745
7.65	233.7	1470.	7.695
7.70	235.5	1481.	7.645
7.75	237.2	1492.	7.595
7.80	239.0	1503.	7.545
7.85	240.7	1514.	7.495
7.90	242.5	1525.	7.445
7.95	244.2	1536.	7.395

NO.3 F.WING F.O.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
8.00	246.0	1547.	7.345
8.05	247.7	1558.	7.295
8.10	249.5	1569.	7.245
8.15	251.2	1580.	7.195
8.20	253.0	1591.	7.145
8.25	254.7	1602.	7.095
8.30	256.5	1613.	7.045
8.35	258.2	1624.	6.995
8.40	260.0	1635.	6.945
8.45	261.7	1646.	6.895
8.50	263.5	1657.	6.845
8.55	265.2	1668.	6.795
8.60	267.0	1679.	6.745
8.65	268.8	1690.	6.695
8.70	270.5	1701.	6.645
8.75	272.3	1712.	6.595
8.80	274.0	1723.	6.545
8.85	275.8	1734.	6.495
8.90	277.5	1745.	6.445
8.95	279.3	1756.	6.395
9.00	281.0	1767.	6.345
9.05	282.8	1778.	6.295
9.10	284.5	1789.	6.245
9.15	286.3	1800.	6.195
9.20	288.0	1812.	6.145
9.25	289.8	1823.	6.095
9.30	291.5	1834.	6.045
9.35	293.3	1845.	5.995
9.40	295.1	1856.	5.945
9.45	296.8	1867.	5.895
9.50	298.6	1878.	5.845
9.55	300.3	1889.	5.795
9.60	302.1	1900.	5.745
9.65	303.8	1911.	5.695
9.70	305.6	1922.	5.645
9.75	307.3	1933.	5.595
9.80	309.1	1944.	5.545
9.85	310.8	1955.	5.495
9.90	312.6	1966.	5.445
9.95	314.3	1977.	5.395
10.00	316.1	1988.	5.345
10.05	317.9	1999.	5.295
10.10	319.6	2010.	5.245
10.15	321.4	2021.	5.195
10.20	323.1	2032.	5.145
10.25	324.9	2043.	5.095
10.30	326.6	2054.	5.045
10.35	328.4	2065.	4.995
10.40	330.1	2076.	4.945
10.45	331.9	2087.	4.895
10.50	333.6	2098.	4.845
10.55	335.4	2109.	4.795
10.60	337.1	2120.	4.745
10.65	338.9	2131.	4.695
10.70	340.6	2142.	4.645
10.75	342.4	2153.	4.595
10.80	344.2	2164.	4.545
10.85	345.9	2175.	4.495
10.90	347.7	2186.	4.445
10.95	349.4	2197.	4.395
11.00	351.2	2209.	4.345
11.05	352.9	2220.	4.295
11.10	354.7	2231.	4.245
11.15	356.4	2242.	4.195
11.20	358.2	2253.	4.145
11.25	359.9	2264.	4.095
11.30	361.7	2275.	4.045
11.35	363.4	2286.	3.995
11.40	365.2	2297.	3.945
11.45	366.9	2308.	3.895
11.50	368.7	2319.	3.845
11.55	370.5	2330.	3.795
11.60	372.2	2341.	3.745
11.65	374.0	2352.	3.695
11.70	375.7	2363.	3.645
11.75	377.5	2374.	3.595
11.80	379.2	2385.	3.545
11.85	381.0	2396.	3.495
11.90	382.7	2407.	3.445
11.95	384.5	2418.	3.395

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
12.00	386.2	2429.	3.345
12.05	388.0	2440.	3.295
12.10	389.7	2451.	3.245
12.15	391.5	2462.	3.195
12.20	393.3	2473.	3.145
12.25	395.0	2484.	3.095
12.30	396.8	2495.	3.045
12.35	398.5	2506.	2.995
12.40	400.3	2517.	2.945
12.45	402.0	2528.	2.895
12.50	403.8	2539.	2.845
12.55	405.5	2550.	2.795
12.60	407.3	2561.	2.745
12.65	409.0	2572.	2.695
12.70	410.8	2583.	2.645
12.75	412.5	2594.	2.595
12.80	414.3	2605.	2.545
12.85	416.0	2617.	2.495
12.90	417.8	2628.	2.445
12.95	419.6	2639.	2.395
13.00	421.3	2650.	2.345
13.05	423.1	2661.	2.295
13.10	424.8	2672.	2.245
13.15	426.6	2683.	2.195
13.20	428.3	2694.	2.145
13.25	430.1	2705.	2.095
13.30	431.8	2716.	2.045
13.35	433.6	2727.	1.995
13.40	435.3	2738.	1.945
13.45	437.1	2749.	1.895
13.50	438.8	2760.	1.845
13.55	440.6	2771.	1.795
13.60	442.3	2782.	1.745
13.65	444.1	2793.	1.695
13.70	445.9	2804.	1.645
13.75	447.6	2815.	1.595
13.80	449.4	2826.	1.545
13.85	451.1	2837.	1.495
13.90	452.9	2848.	1.445
13.95	454.6	2859.	1.395
14.00	456.4	2870.	1.345
14.05	458.1	2881.	1.295
14.10	459.9	2892.	1.245
14.15	461.6	2903.	1.195
14.20	463.4	2914.	1.145
14.25	465.1	2925.	1.095
14.30	466.7	2935.	1.045
14.35	466.7	2935.	0.995
14.40	466.7	2935.	0.945

NO.3 F.WING F.O.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
0.0	0.0 (2.0)	0 (12.)	15.316
0.05	3.3	21.	15.266
0.10	4.7	29.	15.216
0.15	6.0	38.	15.166
0.20	7.4	46.	15.116
0.25	8.8	55.	15.066
0.30	10.2	64.	15.016
0.35	11.6	73.	14.966
0.40	13.1	82.	14.916
0.45	14.5	91.	14.866
0.50	16.0	100.	14.816
0.55	17.4	110.	14.766
0.60	18.9	119.	14.716
0.65	20.4	128.	14.666
0.70	21.8	137.	14.616
0.75	23.3	147.	14.566
0.80	24.8	156.	14.516
0.85	26.3	165.	14.466
0.90	27.8	175.	14.416
0.95	29.4	185.	14.366
1.00	30.9	194.	14.316
1.05	32.5	204.	14.266
1.10	34.0	214.	14.216
1.15	35.5	223.	14.166
1.20	37.1	233.	14.116
1.25	38.6	243.	14.066
1.30	40.7	253.	14.016
1.35	[illegible]	262.	13.966
1.40	43.3	272.	13.916
1.45	44.8	282.	13.866
1.50	46.4	292.	13.816
1.55	48.0	302.	13.766
1.60	49.6	312.	13.716
1.65	51.2	322.	13.666
1.70	52.7	332.	13.616
1.75	54.3	342.	13.566
1.80	55.9	351.	13.516
1.85	57.4	361.	13.466
1.90	59.0	371.	13.416
1.95	60.6	381.	13.366
2.00	62.1	391.	13.316
2.05	63.7	401.	13.266
2.10	65.3	410.	13.216
2.15	66.8	420.	13.166
2.20	68.4	430.	13.116
2.25	70.0	440.	13.066
2.30	71.5	450.	13.016
2.35	73.0	459.	12.966
2.40	74.6	469.	12.916
2.45	76.1	479.	12.866
2.50	77.6	488.	12.816
2.55	79.2	498.	12.766
2.60	80.7	507.	12.716
2.65	82.2	517.	12.666
2.70	83.7	526.	12.616
2.75	85.2	536.	12.566
2.80	86.7	545.	12.516
2.85	88.2	554.	12.466
2.90	89.6	564.	12.416
2.95	91.1	573.	12.366
3.00	92.6	582.	12.316
3.05	94.1	592.	12.266
3.10	95.5	601.	12.216
3.15	97.0	610.	12.166
3.20	98.4	619.	12.116
3.25	99.8	628.	12.066
3.30	101.3	637.	12.016
3.35	102.7	646.	11.966
3.40	104.1	655.	11.916
3.45	105.6	664.	11.866
3.50	107.1	674.	11.816
3.55	108.6	683.	11.766
3.60	110.1	693.	11.716
3.65	111.6	702.	11.666
3.70	113.1	711.	11.616
3.75	114.6	721.	11.566
3.80	116.1	730.	11.516
3.85	117.5	739.	11.466
3.90	119.0	748.	11.416
3.95	120.4	757.	11.366

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
4.00	121.9	767.	11.316
4.05	123.3	776.	11.266
4.10	124.8	785.	11.216
4.15	126.2	794.	11.166
4.20	127.7	803.	11.116
4.25	129.1	812.	11.066
4.30	130.5	821.	11.016
4.35	132.0	830.	10.966
4.40	133.4	839.	10.916
4.45	134.8	848.	10.866
4.50	136.2	857.	10.816
4.55	137.7	866.	10.766
4.60	139.1	875.	10.716
4.65	140.5	884.	10.666
4.70	142.0	893.	10.616
4.75	143.4	902.	10.566
4.80	144.8	911.	10.516
4.85	146.3	920.	10.466
4.90	147.7	929.	10.416
4.95	149.1	938.	10.366
5.00	150.5	947.	10.316
5.05	152.0	956.	10.266
5.10	153.4	965.	10.216
5.15	154.9	974.	10.166
5.20	156.3	983.	10.116
5.25	157.8	992.	10.066
5.30	159.2	1001.	10.016
5.35	160.7	1010.	9.966
5.40	162.1	1020.	9.916
5.45	163.6	1029.	9.866
5.50	165.1	1038.	9.816
5.55	166.5	1047.	9.766
5.60	168.0	1057.	9.716
5.65	169.5	1066.	9.666
5.70	171.0	1076.	9.616
5.75	172.5	1085.	9.566
5.80	174.0	1094.	9.516
5.85	175.5	1104.	9.466
5.90	177.0	1113.	9.416
5.95	178.6	1123.	9.366
6.00	180.1	1133.	9.316
6.05	181.6	1142.	9.266
6.10	183.2	1152.	9.216
6.15	184.7	1162.	9.166
6.20	186.2	1171.	9.116
6.25	187.8	1181.	9.066
6.30	189.3	1191.	9.016
6.35	190.9	1201.	8.966
6.40	192.4	1210.	8.916
6.45	194.0	1220.	8.866
6.50	195.6	1230.	8.816
6.55	197.1	1240.	8.766
6.60	198.7	1250.	8.716
6.65	200.3	1260.	8.666
6.70	201.9	1270.	8.616
6.75	203.4	1279.	8.566
6.80	205.1	1290.	8.516
6.85	206.8	1301.	8.466
6.90	208.6	1312.	8.416
6.95	210.3	1323.	8.366
7.00	212.0	1333.	8.316
7.05	213.8	1344.	8.266
7.10	215.5	1355.	8.216
7.15	217.2	1366.	8.166
7.20	219.0	1377.	8.116
7.25	220.7	1388.	8.066
7.30	222.5	1399.	8.016
7.35	224.2	1410.	7.966
7.40	226.0	1421.	7.916
7.45	227.7	1432.	7.866
7.50	229.5	1443.	7.816
7.55	231.2	1454.	7.766
7.60	233.0	1465.	7.716
7.65	234.7	1476.	7.666
7.70	236.5	1487.	7.616
7.75	238.2	1498.	7.566
7.80	240.0	1509.	7.516
7.85	241.7	1520.	7.466
7.90	243.5	1531.	7.416
7.95	245.2	1542.	7.366

NO.3 F.WING F.O.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
8.00	247.0	1553.	7.316	12.00	387.3	2435.	3.316
8.05	248.7	1564.	7.266	12.05	389.0	2446.	3.266
8.10	250.5	1575.	7.216	12.10	390.8	2458.	3.216
8.15	252.2	1586.	7.166	12.15	392.5	2469.	3.166
8.20	254.0	1597.	7.116	12.20	394.3	2480.	3.116
8.25	255.7	1608.	7.066	12.25	396.0	2491.	3.066
8.30	257.5	1619.	7.016	12.30	397.8	2502.	3.016
8.35	259.2	1630.	6.966	12.35	399.5	2513.	2.966
8.40	261.0	1641.	6.916	12.40	401.3	2524.	2.916
8.45	262.8	1652.	6.866	12.45	403.0	2535.	2.866
8.50	264.5	1663.	6.816	12.50	404.8	2546.	2.816
8.55	266.3	1675.	6.766	12.55	406.5	2557.	2.766
8.60	268.0	1686.	6.716	12.60	408.3	2568.	2.716
8.65	269.8	1697.	6.666	12.65	410.0	2579.	2.666
8.70	271.5	1708.	6.616	12.70	411.8	2590.	2.616
8.75	273.3	1719.	6.566	12.75	413.6	2601.	2.566
8.80	275.0	1730.	6.516	12.80	415.3	2612.	2.516
8.85	276.8	1741.	6.466	12.85	417.1	2623.	2.466
8.90	278.5	1752.	6.416	12.90	418.8	2634.	2.416
8.95	280.3	1763.	6.366	12.95	420.6	2645.	2.366
9.00	282.0	1774.	6.316	13.00	422.3	2656.	2.316
9.05	283.8	1785.	6.266	13.05	424.1	2667.	2.266
9.10	285.6	1796.	6.216	13.10	425.8	2678.	2.216
9.15	287.3	1807.	6.166	13.15	427.6	2689.	2.166
9.20	289.1	1818.	6.116	13.20	429.3	2700.	2.116
9.25	290.8	1829.	6.066	13.25	431.1	2711.	2.066
9.30	292.6	1840.	6.016	13.30	432.8	2722.	2.016
9.35	294.3	1851.	5.966	13.35	434.6	2733.	1.966
9.40	296.1	1862.	5.916	13.40	436.3	2744.	1.916
9.45	297.8	1873.	5.866	13.45	438.1	2755.	1.866
9.50	299.6	1884.	5.816	13.50	439.9	2766.	1.816
9.55	301.3	1895.	5.766	13.55	441.6	2777.	1.766
9.60	303.1	1906.	5.716	13.60	443.4	2788.	1.716
9.65	304.8	1917.	5.666	13.65	445.1	2799.	1.666
9.70	306.6	1928.	5.616	13.70	446.9	2810.	1.616
9.75	308.3	1939.	5.566	13.75	448.6	2821.	1.566
9.80	310.1	1950.	5.516	13.80	450.4	2832.	1.516
9.85	311.9	1961.	5.466	13.85	452.1	2843.	1.466
9.90	313.6	1972.	5.416	13.90	453.9	2855.	1.416
9.95	315.4	1983.	5.366	13.95	455.6	2866.	1.366
10.00	317.1	1994.	5.316	14.00	457.4	2877.	1.316
10.05	318.9	2005.	5.266	14.05	459.1	2888.	1.266
10.10	320.6	2016.	5.216	14.10	460.9	2899.	1.216
10.15	322.4	2027.	5.166	14.15	462.7	2910.	1.166
10.20	324.1	2038.	5.116	14.20	464.4	2921.	1.116
10.25	325.9	2049.	5.066	14.25	466.2	2932.	1.066
10.30	327.6	2060.	5.016	14.30	466.7	2935.	1.016
10.35	329.4	2072.	4.966	14.35	466.7	2935.	0.966
10.40	331.1	2083.	4.916	14.40	466.7	2935.	0.916
10.45	332.9	2094.	4.866				
10.50	334.5	2105.	4.816				
10.55	336.4	2116.	4.766				
10.60	338.2	2127.	4.716				
10.65	339.9	2138.	4.666				
10.70	341.7	2149.	4.616				
10.75	343.4	2160.	4.566				
10.80	345.2	2171.	4.516				
10.85	346.9	2182.	4.466				
10.90	348.7	2193.	4.416				
10.95	350.4	2204.	4.366				
11.00	352.2	2215.	4.316				
11.05	353.9	2226.	4.266				
11.10	355.7	2237.	4.216				
11.15	357.4	2248.	4.166				
11.20	359.2	2259.	4.116				
11.25	361.0	2270.	4.066				
11.30	362.7	2281.	4.016				
11.35	364.5	2292.	3.966				
11.40	366.2	2303.	3.916				
11.45	368.0	2314.	3.866				
11.50	369.7	2325.	3.816				
11.55	371.5	2336.	3.766				
11.60	373.2	2347.	3.716				
11.65	375.0	2358.	3.666				
11.70	376.7	2369.	3.616				
11.75	378.5	2380.	3.566				
11.80	380.2	2391.	3.516				
11.85	382.0	2402.	3.466				
11.90	383.7	2413.	3.416				
11.95	385.5	2424.	3.366				

NO.3 A.WING F.O.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
0.0	0.0 (1.2)	0 (7.)	14.555	4.00	151.4	952.	10.555
0.05	2.8	17.	14.505	4.05	153.5	966.	10.505
0.10	4.3	27.	14.455	4.10	155.7	979.	10.455
0.15	5.9	37.	14.405	4.15	157.9	993.	10.405
0.20	7.5	47.	14.355	4.20	160.0	1006.	10.355
0.25	9.1	57.	14.305	4.25	162.2	1020.	10.305
0.30	10.7	67.	14.255	4.30	164.4	1034.	10.255
0.35	12.3	77.	14.205	4.35	166.5	1047.	10.205
0.40	13.9	87.	14.155	4.40	168.7	1061.	10.155
0.45	15.5	97.	14.105	4.45	170.9	1075.	10.105
0.50	17.0	107.	14.055	4.50	173.1	1088.	10.055
0.55	18.6	117.	14.005	4.55	175.3	1102.	10.005
0.60	20.2	127.	13.955	4.60	177.4	1116.	9.955
0.65	21.8	137.	13.905	4.65	179.6	1130.	9.905
0.70	23.4	147.	13.855	4.70	181.8	1143.	9.855
0.75	25.0	157.	13.805	4.75	184.0	1157.	9.805
0.80	26.6	168.	13.755	4.80	186.1	1171.	9.755
0.85	28.3	178.	13.705	4.85	188.3	1184.	9.705
0.90	29.9	188.	13.655	4.90	190.5	1198.	9.655
0.95	31.6	198.	13.605	4.95	192.7	1212.	9.605
1.00	33.2	209.	13.555	5.00	194.9	1225.	9.555
1.05	34.9	219.	13.505	5.05	197.0	1239.	9.505
1.10	36.6	230.	13.455	5.10	199.2	1253.	9.455
1.15	38.3	241.	13.405	5.15	201.4	1267.	9.405
1.20	40.0	251.	13.355	5.20	203.6	1281.	9.355
1.25	41.7	262.	13.305	5.25	205.8	1294.	9.305
1.30	43.4	273.	13.255	5.30	208.0	1308.	9.255
1.35	45.2	284.	13.205	5.35	210.2	1322.	9.205
1.40	46.9	295.	13.155	5.40	212.4	1336.	9.155
1.45	48.7	306.	13.105	5.45	214.6	1350.	9.105
1.50	50.5	318.	13.055	5.50	216.8	1363.	9.055
1.55	52.3	329.	13.005	5.55	219.0	1377.	9.005
1.60	54.1	340.	12.955	5.60	221.2	1391.	8.955
1.65	56.0	352.	12.905	5.65	223.4	1405.	8.905
1.70	57.8	363.	12.855	5.70	225.6	1419.	8.855
1.75	59.6	375.	12.805	5.75	227.8	1432.	8.805
1.80	61.5	387.	12.755	5.80	229.9	1446.	8.755
1.85	63.4	398.	12.705	5.85	232.1	1460.	8.705
1.90	65.2	410.	12.655	5.90	234.3	1474.	8.655
1.95	67.1	422.	12.605	5.95	236.5	1487.	8.605
2.00	69.0	434.	12.555	6.00	238.7	1501.	8.555
2.05	70.9	446.	12.505	6.05	240.9	1515.	8.505
2.10	72.8	458.	12.455	6.10	243.1	1529.	8.455
2.15	74.7	470.	12.405	6.15	245.3	1543.	8.405
2.20	76.6	482.	12.355	6.20	247.5	1556.	8.355
2.25	78.5	494.	12.305	6.25	249.7	1570.	8.305
2.30	80.5	506.	12.255	6.30	251.9	1584.	8.255
2.35	82.4	518.	12.205	6.35	254.1	1598.	8.205
2.40	84.4	531.	12.155	6.40	256.2	1612.	8.155
2.45	86.4	543.	12.105	6.45	258.4	1625.	8.105
2.50	88.4	556.	12.055	6.50	260.6	1639.	8.055
2.55	[illegible]	568.	12.005	6.55	262.8	1653.	8.005
2.60	[illegible]	581.	11.955	6.60	265.0	1667.	7.955
2.65	94.4	594.	11.905	6.65	267.2	1680.	7.905
2.70	96.4	606.	11.855	6.70	269.4	1694.	7.855
2.75	98.4	619.	11.805	6.75	271.6	1708.	7.805
2.80	100.5	632.	11.755	6.80	273.8	1722.	7.755
2.85	102.5	645.	11.705	6.85	276.0	1736.	7.705
2.90	104.6	658.	11.655	6.90	278.2	1749.	7.655
2.95	106.7	671.	11.605	6.95	280.4	1763.	7.605
3.00	108.8	684.	11.555	7.00	282.5	1777.	7.555
3.05	110.9	697.	11.505	7.05	284.7	1791.	7.505
3.10	112.9	710.	11.455	7.10	286.9	1805.	7.455
3.15	115.0	723.	11.405	7.15	289.1	1818.	7.405
3.20	117.1	737.	11.355	7.20	291.3	1832.	7.355
3.25	119.3	750.	11.305	7.25	293.5	1846.	7.305
3.30	121.4	763.	11.255	7.30	295.7	1860.	7.255
3.35	123.5	777.	11.205	7.35	297.9	1873.	7.205
3.40	125.6	790.	11.155	7.40	300.1	1887.	7.155
3.45	127.7	803.	11.105	7.45	302.3	1901.	7.105
3.50	129.9	817.	11.055	7.50	304.5	1915.	7.055
3.55	132.0	830.	11.005	7.55	306.7	1929.	7.005
3.60	134.1	844.	10.955	7.60	308.8	1942.	6.955
3.65	136.3	857.	10.905	7.65	311.0	1956.	6.905
3.70	138.4	871.	10.855	7.70	313.2	1970.	6.855
3.75	140.6	884.	10.805	7.75	315.4	1984.	6.805
3.80	142.7	898.	10.755	7.80	317.6	1997.	6.755
3.85	144.9	911.	10.705	7.85	319.8	2011.	6.705
3.90	147.0	925.	10.655	7.90	322.0	2025.	6.655
3.95	149.2	938.	10.605	7.95	324.2	2039.	6.605

NO.3 A.WING F.O.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
8.00	326.4	2053.	6.555	12.00	501.7	3155.	2.555
8.05	328.6	2066.	6.505	12.05	503.9	3169.	2.505
8.10	330.8	2080.	6.455	12.10	506.1	3183.	2.455
8.15	333.0	2094.	6.405	12.15	508.3	3197.	2.405
8.20	335.1	2108.	6.355	12.20	510.5	3211.	2.355
8.25	337.3	2122.	6.305	12.25	512.7	3224.	2.305
8.30	339.5	2135.	6.255	12.30	514.9	3238.	2.255
8.35	341.7	2149.	6.205	12.35	517.1	3252.	2.205
8.40	343.9	2163.	6.155	12.40	519.3	3266.	2.155
8.45	346.1	2177.	6.105	12.45	521.5	3279.	2.105
8.50	348.3	2190.	6.055	12.50	523.6	3293.	2.055
8.55	350.5	2204.	6.005	12.55	525.8	3307.	2.005
8.60	352.7	2218.	5.955	12.60	528.0	3321.	1.955
8.65	354.9	2232.	5.905	12.65	530.2	3335.	1.905
8.70	357.1	2246.	5.855	12.70	532.4	3348.	1.855
8.75	359.3	2259.	5.805	12.75	534.6	3362.	1.805
8.80	361.5	2273.	5.755	12.80	536.8	3376.	1.755
8.85	363.6	2287.	5.705	12.85	539.0	3390.	1.705
8.90	365.8	2301.	5.655	12.90	541.2	3404.	1.655
8.95	368.0	2315.	5.605	12.95	543.4	3417.	1.605
9.00	370.2	2328.	5.555	13.00	545.6	3431.	1.555
9.05	372.4	2342.	5.505	13.05	547.8	3445.	1.505
9.10	374.6	2356.	5.455	13.10	550.0	3459.	1.455
9.15	376.8	2370.	5.405	13.15	552.1	3472.	1.405
9.20	379.0	2383.	5.355	13.20	554.3	3486.	1.355
9.25	381.2	2397.	5.305	13.25	556.5	3500.	1.305
9.30	383.4	2411.	5.255	13.30	558.7	3514.	1.255
9.35	385.6	2425.	5.205	13.35	560.9	3528.	1.205
9.40	387.8	2439.	5.155	13.40	563.1	3541.	1.155
9.45	389.9	2452.	5.105	13.45	565.3	3555.	1.105
9.50	392.1	2466.	5.055	13.50	567.5	3569.	1.055
9.55	394.3	2480.	5.005	13.55	567.8	3571.	1.005
9.60	396.5	2494.	4.955	13.60	567.8	3571.	0.955
9.65	398.7	2508.	4.905	13.65	567.8	3571.	0.905
9.70	400.9	2521.	4.855	13.70	567.8	3571.	0.855
9.75	403.1	2535.	4.805	13.75	567.8	3571.	0.805
9.80	405.3	2549.	4.755	13.80	567.8	3571.	0.755
9.85	407.5	2563.	4.705	13.85	567.8	3571.	0.705
9.90	409.7	2576.	4.655	13.90	567.8	3571.	0.655
9.95	411.9	2590.	4.605	13.95	567.8	3571.	0.605
10.00	414.1	2604.	4.555				
10.05	416.3	2618.	4.505				
10.10	418.4	2632.	4.455				
10.15	420.6	2645.	4.405				
10.20	422.8	2659.	4.355				
10.25	425.0	2673.	4.305				
10.30	427.2	2687.	4.255				
10.35	429.4	2701.	4.205				
10.40	431.6	2714.	4.155				
10.45	433.8	2728.	4.105				
10.50	436.0	2742.	4.055				
10.55	438.2	2756.	4.005				
10.60	440.4	2769.	3.955				
10.65	442.5	2783.	3.905				
10.70	444.7	2797.	3.855				
10.75	446.9	2811.	3.805				
10.80	449.1	2825.	3.755				
10.85	451.3	2838.	3.705				
10.90	453.5	2852.	3.655				
10.95	455.7	2866.	3.605				
11.00	457.9	2880.	3.555				
11.05	460.1	2893.	3.505				
11.10	462.3	2907.	3.455				
11.15	464.5	2921.	3.405				
11.20	466.7	2935.	3.355				
11.25	468.8	2949.	3.305				
11.30	471.0	2962.	3.255				
11.35	473.2	2976.	3.205				
11.40	475.4	2990.	3.155				
11.45	477.6	3004.	3.105				
11.50	479.8	3018.	3.055				
11.55	482.0	3031.	3.005				
11.60	484.2	3045.	2.955				
11.65	486.4	3059.	2.905				
11.70	488.6	3073.	2.855				
11.75	490.8	3086.	2.805				
11.80	493.0	3100.	2.755				
11.85	495.2	3114.	2.705				
11.90	497.3	3128.	2.655				
11.95	499.5	3142.	2.605				

NO.3 A.WING F.O.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
0.0	0.0 (1.2)	0 (7.)	14.558	4.00	151.5	953.	10.558
0.05	2.8	17.	14.508	4.05	153.6	966.	10.508
0.10	4.3	27.	14.458	4.10	155.8	980.	10.458
0.15	5.9	37.	14.408	4.15	158.0	993.	10.408
0.20	7.5	47.	14.358	4.20	160.1	1007.	10.358
0.25	9.1	57.	14.308	4.25	162.3	1021.	10.308
0.30	10.7	67.	14.258	4.30	164.5	1034.	10.258
0.35	12.3	78.	14.208	4.35	166.7	1048.	10.208
0.40	13.9	87.	14.158	4.40	168.8	1062.	10.158
0.45	15.5	97.	14.108	4.45	171.0	1075.	10.108
0.50	17.0	107.	14.058	4.50	173.2	1089.	10.058
0.55	18.6	117.	14.008	4.55	175.4	1103.	10.008
0.60	20.2	127.	13.958	4.60	177.5	1117.	9.958
0.65	21.8	137.	13.908	4.65	179.7	1130.	9.908
0.70	23.4	147.	13.858	4.70	181.9	1144.	9.858
0.75	25.0	157.	13.808	4.75	184.1	1158.	9.808
0.80	26.7	168.	13.758	4.80	186.3	1171.	9.758
0.85	28.3	178.	13.708	4.85	188.4	1185.	9.708
0.90	29.9	188.	13.658	4.90	190.6	1199.	9.658
0.95	31.6	199.	13.608	4.95	192.8	1213.	9.608
1.00	33.2	209.	13.558	5.00	195.0	1226.	9.558
1.05	34.9	219.	13.508	5.05	197.2	1240.	9.508
1.10	36.6	230.	13.458	5.10	199.4	1254.	9.458
1.15	38.3	241.	13.408	5.15	201.6	1268.	9.408
1.20	40.0	251.	13.358	5.20	203.8	1281.	9.358
1.25	41.7	262.	13.308	5.25	206.0	1295.	9.308
1.30	43.4	273.	13.258	5.30	208.1	1309.	9.258
1.35	45.2	284.	13.208	5.35	210.3	1323.	9.208
1.40	47.0	295.	13.158	5.40	212.5	1337.	9.158
1.45	48.7	307.	13.108	5.45	214.7	1350.	9.108
1.50	50.5	318.	13.058	5.50	216.9	1364.	9.058
1.55	52.4	329.	13.008	5.55	219.1	1378.	9.008
1.60	54.2	341.	12.958	5.60	221.3	1392.	8.958
1.65	56.0	352.	12.908	5.65	223.5	1406.	8.908
1.70	57.8	364.	12.858	5.70	225.7	1419.	8.858
1.75	59.7	375.	12.808	5.75	227.9	1433.	8.808
1.80	61.5	387.	12.758	5.80	230.1	1447.	8.758
1.85	63.4	399.	12.708	5.85	232.3	1461.	8.708
1.90	65.3	410.	12.658	5.90	234.5	1475.	8.658
1.95	67.1	422.	12.608	5.95	236.7	1488.	8.608
2.00	69.0	434.	12.558	6.00	238.8	1502.	8.558
2.05	70.9	446.	12.508	6.05	241.0	1516.	8.508
2.10	72.8	458.	12.458	6.10	243.2	1530.	8.458
2.15	74.7	470.	12.408	6.15	245.4	1543.	8.408
2.20	76.7	482.	12.358	6.20	247.6	1557.	8.358
2.25	78.6	494.	12.308	6.25	249.8	1571.	8.308
2.30	80.5	507.	12.258	6.30	252.0	1585.	8.258
2.35	82.5	519.	12.208	6.35	254.2	1599.	8.208
2.40	84.5	531.	12.158	6.40	256.4	1612.	8.158
2.45	86.4	544.	12.108	6.45	258.6	1626.	8.108
2.50	88.4	556.	12.058	6.50	260.8	1640.	8.058
2.55	90.4	569.	12.008	6.55	263.0	1654.	8.008
2.60	92.4	581.	11.958	6.60	265.1	1668.	7.958
2.65	94.4	594.	11.908	6.65	267.3	1681.	7.908
2.70	96.5	607.	11.858	6.70	269.5	1695.	7.858
2.75	98.5	620.	11.808	6.75	271.7	1709.	7.808
2.80	100.6	632.	11.758	6.80	273.9	1723.	7.758
2.85	102.6	645.	11.708	6.85	276.1	1736.	7.708
2.90	104.7	658.	11.658	6.90	278.3	1750.	7.658
2.95	106.8	671.	11.608	6.95	280.5	1764.	7.608
3.00	108.8	684.	11.558	7.00	282.7	1778.	7.558
3.05	110.9	698.	11.508	7.05	284.9	1792.	7.508
3.10	113.0	711.	11.458	7.10	287.1	1805.	7.458
3.15	115.1	724.	11.408	7.15	289.3	1819.	7.408
3.20	117.2	737.	11.358	7.20	291.4	1833.	7.358
3.25	119.3	750.	11.308	7.25	293.6	1847.	7.308
3.30	121.4	764.	11.258	7.30	295.8	1860.	7.258
3.35	123.6	777.	11.208	7.35	298.0	1874.	7.208
3.40	125.7	790.	11.158	7.40	300.2	1888.	7.158
3.45	127.8	804.	11.108	7.45	302.4	1902.	7.108
3.50	130.0	817.	11.058	7.50	304.6	1916.	7.058
3.55	132.1	831.	11.008	7.55	306.8	1929.	7.008
3.60	134.2	844.	10.958	7.60	309.0	1943.	6.958
3.65	136.4	858.	10.908	7.65	311.2	1957.	6.908
3.70	138.5	871.	10.858	7.70	313.4	1971.	6.858
3.75	140.7	885.	10.808	7.75	315.6	1985.	6.808
3.80	142.8	898.	10.758	7.80	317.7	1998.	6.758
3.85	145.0	912.	10.708	7.85	319.9	2012.	6.708
3.90	147.1	925.	10.658	7.90	322.1	2026.	6.658
3.95	149.3	939.	10.608	7.95	324.3	2040.	6.608

NO.3 A.WING F.O.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
8.00	326.5	2053.	6.558	12.00	501.9	3156.	2.558
8.05	328.7	2067.	6.508	12.05	504.1	3170.	2.508
8.10	330.9	2081.	6.458	12.10	506.2	3184.	2.458
8.15	333.1	2095.	6.408	12.15	508.4	3198.	2.408
8.20	335.3	2109.	6.358	12.20	510.6	3211.	2.358
8.25	337.5	2122.	6.308	12.25	512.8	3225.	2.308
8.30	339.7	2136.	6.258	12.30	515.0	3239.	2.258
8.35	341.9	2150.	6.208	12.35	517.2	3253.	2.208
8.40	344.0	2164.	6.158	12.40	519.4	3266.	2.158
8.45	346.2	2178.	6.108	12.45	521.6	3280.	2.108
8.50	348.4	2191.	6.058	12.50	523.8	3294.	2.058
8.55	350.6	2205.	6.008	12.55	526.0	3308.	2.008
8.60	352.8	2219.	5.958	12.60	528.2	3322.	1.958
8.65	355.0	2233.	5.908	12.65	530.4	3335.	1.908
8.70	357.2	2246.	5.858	12.70	532.5	3349.	1.858
8.75	359.4	2260.	5.808	12.75	534.7	3363.	1.808
8.80	361.6	2274.	5.758	12.80	536.9	3377.	1.758
8.85	363.8	2288.	5.708	12.85	539.1	3391.	1.708
8.90	366.0	2302.	5.658	12.90	541.3	3404.	1.658
8.95	368.2	2315.	5.608	12.95	543.5	3418.	1.608
9.00	370.4	2329.	5.558	13.00	545.7	3432.	1.558
9.05	372.5	2343.	5.508	13.05	547.9	3446.	1.508
9.10	374.7	2357.	5.458	13.10	550.1	3459.	1.458
9.15	376.9	2370.	5.408	13.15	552.3	3473.	1.408
9.20	379.1	2384.	5.358	13.20	554.5	3487.	1.358
9.25	381.3	2398.	5.308	13.25	556.7	3501.	1.308
9.30	383.5	2412.	5.258	13.30	558.9	3515.	1.258
9.35	385.7	2426.	5.208	13.35	561.0	3528.	1.208
9.40	387.9	2439.	5.158	13.40	563.2	3542.	1.158
9.45	390.1	2453.	5.108	13.45	565.4	3556.	1.108
9.50	392.3	2467.	5.058	13.50	567.6	3570.	1.058
9.55	394.5	2481.	5.008	13.55	567.8	3571.	1.008
9.60	396.7	2495.	4.958	13.60	567.8	3571.	0.958
9.65	398.8	2508.	4.908	13.65	567,8	3571.	0.908
9.70	401.0	2522.	4.858				
9.75	403.2	2536.	4.808				
9.80	405.4	2550.	4.758				
9.85	407.6	2563.	4.708				
9.90	409.8	2577.	4.658				
9.95	412.0	2591.	4.608				
10.00	414.2	2605.	4.558				
10.05	416.4	2619.	4.508				
10.10	418.6	2632.	4.458				
10.15	420.8	2646.	4.408				
10.20	423.0	2660.	4.358				
10.25	425.2	2674.	4.308				
10.30	427.3	2688.	4.258				
10.35	429.5	2701.	4.208				
10.40	431.7	2715.	4.158				
10.45	433.9	2729.	4.108				
10.50	436.1	2743.	4.058				
10.55	438.3	2756.	4.008				
10.60	440.5	2770.	3.958				
10.65	442.7	2784.	3.908				
10.70	444.9	2798.	3.858				
10.75	447.1	2812.	3.808				
10.80	449.3	2825.	3.758				
10.85	451.4	2839.	3.708				
10.90	453.6	2853.	3.658				
10.95	455.8	2867.	3.608				
11.00	458.0	2880.	3.558				
11.05	460.2	2894.	3.508				
11.10	462.4	2908.	3.458				
11.15	464.6	2922.	3.408				
11.20	466.8	2936.	3.358				
11.25	469.0	2949.	3.308				
11.30	471.2	2963.	3.258				
11.35	473.4	2977.	3.208				
11.40	475.6	2991.	3.158				
11.45	477.7	3005.	3.108				
11.50	479.9	3018.	3.058				
11.55	482.1	3032.	3.008				
11.60	484.3	3046.	2.958				
11.65	486.5	3060.	2.908				
11.70	488.7	3073.	2.858				
11.75	490.9	3087.	2.808				
11.80	493.1	3101.	2.758				
11.85	495.3	3115.	2.708				
11.90	497.5	3129.	2.658				
11.95	499.7	3142.	2.608				

DEEP F.O.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
0.0	0.0 (0.6)	0 (4.)	19.626	4.00	100.6	633.	15.626
0.05	0.8	5.	19.576	4.05	102.7	646.	15.576
0.10	0.9	6.	19.526	4.10	104.8	659.	15.526
0.15	1.0	7.	19.476	4.15	106.9	672.	15.476
0.20	1.2	7.	19.426	4.20	109.0	685.	15.426
0.25	1.3	8.	19.376	4.25	111.1	699.	15.376
0.30	1.5	10.	19.326	4.30	113.3	713.	15.326
0.35	2.0	12.	19.276	4.35	115.5	726.	15.276
0.40	2.4	15.	19.226	4.40	117.7	740.	15.226
0.45	2.9	18.	19.176	4.45	119.9	754.	15.176
0.50	3.4	21.	19.126	4.50	122.2	768.	15.126
0.55	3.9	25.	19.076	4.55	124.4	783.	15.076
0.60	4.5	28.	19.026	4.60	126.7	797.	15.026
0.65	5.1	32.	18.976	4.65	129.0	811.	14.976
0.70	5.8	36.	18.926	4.70	131.3	826.	14.926
0.75	6.5	41.	18.876	4.75	133.6	840.	14.876
0.80	7.2	45.	18.826	4.80	136.0	855.	14.826
0.85	8.0	51.	18.776	4.85	138.4	870.	14.776
0.90	8.9	56.	18.726	4.90	140.7	885.	14.726
0.95	9.7	61.	18.676	4.95	143.1	900.	14.676
1.00	10.6	67.	18.626	5.00	145.4	915.	14.626
1.05	11.5	72.	18.576	5.05	147.8	930.	14.576
1.10	12.4	78.	18.526	5.10	150.2	945.	14.526
1.15	13.4	84.	18.476	5.15	152.6	960.	14.476
1.20	14.4	91.	18.426	5.20	155.0	975.	14.426
1.25	15.4	97.	18.376	5.25	157.4	990.	14.376
1.30	16.5	104.	18.326	5.30	159.9	1005.	14.326
1.35	17.6	110.	18.276	5.35	162.3	1021.	14.276
1.40	18.7	117.	18.226	5.40	164.8	1036.	14.226
1.45	19.8	125.	18.176	5.45	167.3	1052.	14.176
1.50	[illegible]	132.	18.126	5.50	169.8	1068.	14.126
1.55	22.1	139.	18.076	5.55	172.3	1083.	14.076
1.60	23.3	147.	18.026	5.60	174.8	1099.	14.026
1.65	24.5	154.	17.976	5.65	177.3	1115.	13.976
1.70	25.8	162.	17.926	5.70	179.8	1131.	13.926
1.75	27.0	170.	17.876	5.75	182.4	1147.	13.876
1.80	28.3	178.	17.826	5.80	184.9	1163.	13.826
1.85	29.6	186.	17.776	5.85	187.5	1179.	13.776
1.90	30.9	195.	17.726	5.90	190.1	1195.	13.726
1.95	32.3	203.	17.676	5.95	192.6	1212.	13.676
2.00	33.6	211.	17.626	6.00	195.2	1228.	13.626
2.05	35.0	220.	17.576	6.05	197.8	1244.	13.576
2.10	36.4	229.	17.526	6.10	200.5	1261.	13.526
2.15	37.8	238.	17.476	6.15	203.1	1277.	13.476
2.20	39.2	246.	17.426	6.20	205.7	1294.	13.426
2.25	40.6	255.	17.376	6.25	208.3	1310.	13.376
2.30	42.1	265.	17.326	6.30	211.0	1327.	13.326
2.35	43.5	274.	17.276	6.35	213.6	1344.	13.276
2.40	45.0	283.	17.226	6.40	216.3	1360.	13.226
2.45	[illegible]	293.	17.176	6.45	219.0	1377.	13.176
2.50	[illegible]	302.	17.126	6.50	221.7	1394.	13.126
2.55	49.6	312.	17.076	6.55	224.4	1411.	13.076
2.60	51.1	321.	17.026	6.60	227.0	1428.	13.026
2.65	52.6	331.	16.976	6.65	229.7	1445.	12.976
2.70	54.2	341.	16.926	6.70	232.5	1462.	12.926
2.75	55.8	351.	16.876	6.75	235.2	1479.	12.876
2.80	57.4	361.	16.826	6.80	237.9	1496.	12.826
2.85	59.0	371.	16.776	6.85	240.6	1513.	12.776
2.90	60.6	381.	16.726	6.90	243.4	1530.	12.726
2.95	62.2	391.	16.676	6.95	246.1	1548.	12.676
3.00	63.8	401.	16.626	7.00	248.8	1565.	12.626
3.05	65.5	412.	16.576	7.05	251.6	1582.	12.576
3.10	67.2	422.	16.526	7.10	254.4	1600.	12.526
3.15	68.8	433.	16.476	7.15	257.1	1617.	12.476
3.20	70.6	444.	16.426	7.20	259.9	1634.	12.426
3.25	72.3	455.	16.376	7.25	262.7	1652.	12.376
3.30	74.0	466.	16.326	7.30	265.5	1670.	12.326
3.35	75.8	477.	16.276	7.35	268.4	1688.	12.276
3.40	77.5	488.	16.226	7.40	271.2	1706.	12.226
3.45	79.3	499.	16.176	7.45	274.1	1724.	12.176
3.50	81.1	510.	16.126	7.50	276.9	1742.	12.126
3.55	83.0	522.	16.076	7.55	278.8	1753.	12.076
3.60	84.8	534.	16.026	7.60	280.1	1762.	12.026
3.65	86.7	545.	15.976	7.65	281.4	1770.	11.976
3.70	88.6	557.	15.926	7.70	282.8	1778.	11.926
3.75	90.6	570.	15.876	7.75	284.1	1787.	11.876
3.80	92.5	582.	15.826	7.80	285.4	1795.	11.826
3.85	94.5	594.	15.776	7.85	286.8	1803.	11.776
3.90	96.5	607.	15.726	7.90	288.1	1812.	11.726
3.95	98.6	620.	15.676	7.95	289.4	1820.	11.676

DEEP F.O.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
8.00	290.8	1829.	11.626	12.00	393.7	2476.	7.626
8.05	292.1	1837.	11.576	12.05	394.4	2480.	7.576
8.10	293.5	1846.	11.526	12.10	395.1	2485.	7.526
8.15	294.8	1854.	11.476	12.15	395.8	2489.	7.476
8.20	296.2	1863.	11.426	12.20	396.4	2493.	7.426
8.25	297.6	1871.	11.376	12.25	397.1	2497.	7.376
8.30	298.9	1880.	11.326	12.30	397.8	2502.	7.326
8.35	300.3	1888.	11.276	12.35	398.4	2506.	7.276
8.40	301.6	1897.	11.226	12.40	399.1	2510.	7.226
8.45	303.0	1906.	11.176	12.45	399.8	2514.	7.176
8.50	304.4	1914.	11.126	12.50	400.4	2518.	7.126
8.55	305.8	1923.	11.076	12.55	401.1	2523.	7.076
8.60	307.1	1931.	11.026	12.60	401.8	2527.	7.026
8.65	308.5	1940.	10.976	12.65	402.5	2531.	6.976
8.70	309.9	1949.	10.926	12.70	403.1	2535.	6.926
8.75	311.2	1957.	10.876	12.75	403.8	2539.	6.876
8.80	312.6	1966.	10.826	12.80	404.5	2544.	6.826
8.85	314.0	1975.	10.776	12.85	405.3	2549.	6.776
8.90	315.4	1983.	10.726	12.90	406.3	2555.	6.726
8.95	316.8	1992.	10.676	12.95	407.3	2562.	6.676
9.00	318.1	2001.	10.626	13.00	408.4	2568.	6.626
9.05	319.5	2009.	10.576	13.05	409.4	2575.	6.576
9.10	320.9	2018.	10.526	13.10	410.4	2581.	6.526
9.15	322.3	2027.	10.476	13.15	411.4	2587.	6.476
9.20	323.7	2036.	10.426	13.20	412.4	2594.	6.426
9.25	325.1	2044.	10.376	13.25	413.4	2600.	6.376
9.30	326.4	2053.	10.326	13.30	414.4	2606.	6.326
9.35	327.8	2062.	10.276	13.35	415.5	2613.	6.276
9.40	329.2	2070.	10.226	13.40	416.5	2619.	6.226
9.45	330.6	2079.	10.176	13.45	417.5	2626.	6.176
9.50	332.0	2088.	10.126	13.50	418.5	2632.	6.126
9.55	333.4	2097.	10.076	13.55	419.5	2638.	6.076
9.60	334.8	2105.	10.026	13.60	420.5	2645.	6.026
9.65	336.2	2114.	9.976	13.65	421.5	2651.	5.976
9.70	337.5	2123.	9.926	13.70	422.5	2657.	5.926
9.75	338.9	2132.	9.876	13.75	423.6	2664.	5.876
9.80	340.3	2140.	9.826	13.80	424.6	2670.	5.826
9.85	341.7	2149.	9.776	13.85	425.6	2677.	5.776
9.90	343.1	2158.	9.726	13.90	426.6	2683.	5.726
9.95	344.5	2167.	9.676	13.95	427.6	2689.	5.676
10.00	345.9	2175.	9.626	14.00	428.6	2696.	5.626
10.05	347.3	2184.	9.576	14.05	429.6	2702.	5.576
10.10	348.7	2193.	9.526	14.10	430.7	2708.	5.526
10.15	350.1	2202.	9.476	14.15	431.7	2715.	5.476
10.20	351.4	2210.	9.426	14.20	432.7	2721.	5.426
10.25	352.8	2219.	9.376	14.25	433.7	2728.	5.376
10.30	354.2	2228.	9.326	14.30	434.7	2734.	5.326
10.35	355.6	2236.	9.276	14.35	435.7	2740.	5.276
10.40	357.0	2245.	9.226	14.40	436.7	2747.	5.226
10.45	358.4	2254.	9.176	14.45	437.8	2753.	5.176
10.50	359.8	2263.	9.126	14.50	438.8	2759.	5.126
10.55	361.2	2271.	9.076	14.55	439.8	2766.	5.076
10.60	362.6	2280.	9.026	14.60	440.8	2772.	5.026
10.65	364.0	2289.	8.976	14.65	441.8	2779.	4.976
10.70	365.3	2298.	8.926	14.70	442.8	2785.	4.926
10.75	366.7	2306.	8.876	14.75	443.8	2791.	4.876
10.80	368.1	2315.	8.826	14.80	444.9	2798.	4.826
10.85	369.5	2324.	8.776	14.85	445.9	2804.	4.776
10.90	370.9	2333.	8.726	14.90	446.9	2810.	4.726
10.95	372.3	2341.	8.676	14.95	447.9	2817.	4.676
11.00	373.7	2350.	8.626	15.00	448.9	2823.	4.626
11.05	375.1	2359.	8.576	15.05	449.4	2826.	4.576
11.10	376.5	2368.	8.526	15.10	449.9	2829.	4.526
11.15	377.9	2376.	8.476	15.15	450.3	2832.	4.476
11.20	379.2	2385.	8.426	15.20	450.8	2835.	4.426
11.25	380.4	2392.	8.376	15.25	451.2	2838.	4.376
11.30	381.3	2398.	8.326	15.30	451.7	2841.	4.326
11.35	382.3	2404.	8.276	15.35	452.1	2843.	4.276
11.40	383.3	2410.	8.226	15.40	452.6	2846.	4.226
11.45	384.2	2416.	8.176	15.45	453.0	2849.	4.176
11.50	385.2	2422.	8.126	15.50	453.5	2852.	4.126
11.55	386.1	2428.	8.076	15.55	453.9	2855.	4.076
11.60	387.1	2434.	8.026	15.60	454.4	2858.	4.026
11.65	388.1	2441.	7.976	15.65	454.8	2860.	3.976
11.70	389.0	2447.	7.926	15.70	455.3	2863.	3.926
11.75	390.0	2453.	7.876	15.75	455.7	2866.	3.876
11.80	391.0	2459.	7.826	15.80	456.2	2869.	3.826
11.85	391.7	2464.	7.776	15.85	456.6	2872.	3.776
11.90	392.4	2468.	7.726	15.90	457.0	2874.	3.726
11.95	393.1	2472.	7.676	15.95	457.5	2877.	3.676

DEEP F.O.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
16.00	457.9	2880.	3.626
16.05	458.4	2883.	3.576
16.10	458.8	2886.	3.526
16.15	459.3	2888.	3.476
16.20	459.7	2891.	3.426
16.25	460.2	2894.	3.376
16.30	460.6	2897.	3.326
16.35	461.0	2899.	3.276
16.40	461.5	2902.	3.226
16.45	461.9	2905.	3.176
16.50	462.4	2908.	3.126
16.55	462.8	2911.	3.076
16.60	463.3	2913.	3.026
16.65	463.7	2916.	2.976
16.70	464.1	2919.	2.926
16.75	464.6	2922.	2.876
16.80	465.0	2925.	2.826
16.85	465.5	2927.	2.776
16.90	465.9	2930.	2.726
16.95	466.4	2933.	2.676
17.00	466.9	2936.	2.626
17.05	467.4	2939.	2.576
17.10	467.8	2942.	2.527
17.15	468.3	2945.	2.477
17.20 OVER FLOW PIPE	468.7	2948.	2.427
17.25	469.1	2950.	2.377
17.30	469.5	2953.	2.327
17.35	469.9	2955.	2.277
17.40	470.3	2958.	2.227

DEEP F.O.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
0.0	0.0 (0.6)	0 (4.)	19.772	4.00	100.0	629.	15.772
0.05	0.8	5.	19.722	4.05	102.1	642.	15.722
0.10	0.9	6.	19.672	4.10	104.1	655.	15.672
0.15	1.1	7.	19.622	4.15	106.1	667.	15.622
0.20	1.2	8.	19.572	4.20	108.2	680.	15.572
0.25	1.4	9.	19.522	4.25	110.3	694.	15.522
0.30	1.6	10.	19.472	4.30	112.4	707.	15.472
0.35	2.0	13.	19.422	4.35	114.5	720.	15.422
0.40	2.5	16.	19.372	4.40	116.7	734.	15.372
0.45	3.0	19.	19.322	4.45	118.9	748.	15.322
0.50	3.5	22.	19.272	4.50	121.0	761.	15.272
0.55	4.0	25.	19.222	4.55	123.2	775.	15.222
0.60	4.6	29.	19.172	4.60	125.5	789.	15.172
0.65	5.3	33.	19.122	4.65	127.7	803.	15.122
0.70	5.9	37.	19.072	4.70	129.9	817.	15.072
0.75	6.6	42.	19.022	4.75	132.2	831.	15.022
0.80	7.4	46.	18.972	4.80	134.5	846.	14.972
0.85	8.2	52.	18.922	4.85	136.8	860.	14.922
0.90	9.0	57.	18.872	4.90	139.1	875.	14.872
0.95	9.9	62.	18.822	4.95	141.4	890.	14.822
1.00	10.8	68.	18.772	5.00	143.8	904.	14.772
1.05	11.7	73.	18.722	5.05	146.1	919.	14.722
1.10	12.6	79.	18.672	5.10	148.5	934.	14.672
1.15	13.6	85.	18.622	5.15	150.9	949.	14.622
1.20	14.6	92.	18.572	5.20	153.3	964.	14.572
1.25	15.6	98.	18.522	5.25	155.7	979.	14.522
1.30	16.7	105.	18.472	5.30	158.1	994.	14.472
1.35	17.7	112.	18.422	5.35	160.5	1010.	14.422
1.40	18.9	119.	18.372	5.40	163.0	1025.	14.372
1.45	20.0	126.	18.322	5.45	165.5	1041.	14.322
1.50	21.2	133.	18.272	5.50	167.9	1056.	14.272
1.55	22.3	140.	18.222	5.55	170.4	1072.	14.222
1.60	23.5	148.	18.172	5.60	172.9	1088.	14.172
1.65	24.7	156.	18.122	5.65	175.4	1103.	14.122
1.70	26.0	163.	18.072	5.70	177.9	1119.	14.072
1.75	27.2	171.	18.022	5.75	180.5	1135.	14.022
1.80	28.5	179.	17.972	5.80	183.0	1151.	13.972
1.85	29.8	188.	17.922	5.85	185.5	1167.	13.922
1.90	31.2	196.	17.872	5.90	188.1	1183.	13.872
1.95	32.5	204.	17.822	5.95	190.7	1199.	13.822
2.00	33.9	213.	17.772	6.00	193.3	1216.	13.772
2.05	35.3	222.	17.722	6.05	196.0	1233.	13.722
2.10	36.6	230.	17.672	6.10	198.7	1249.	13.672
2.15	38.1	239.	17.622	6.15	201.3	1266.	13.622
2.20	39.5	248.	17.572	6.20	204.0	1283.	13.572
2.25	40.9	257.	17.522	6.25	206.7	1300.	13.522
2.30	42.4	267.	17.472	6.30	209.4	1317.	13.472
2.35	43.9	276.	17.422	6.35	212.1	1334.	13.422
2.40	45.4	285.	17.372	6.40	214.8	1351.	13.372
2.45	46.9	295.	17.322	6.45	217.5	1368.	13.322
2.50	48.4	304.	17.272	6.50	220.3	1385.	13.272
2.55	49.9	314.	17.222	6.55	223.0	1403.	13.222
2.60	51.5	324.	17.172	6.60	225.8	1420.	13.172
2.65	53.0	334.	17.122	6.65	228.5	1437.	13.122
2.70	54.6	343.	17.072	6.70	231.3	1455.	13.072
2.75	56.2	353.	17.022	6.75	234.1	1472.	13.022
2.80	57.7	363.	16.972	6.80	236.8	1489.	12.972
2.85	59.3	373.	16.922	6.85	239.6	1507.	12.922
2.90	60.9	383.	16.872	6.90	242.4	1524.	12.872
2.95	62.4	393.	16.822	6.95	245.2	1542.	12.822
3.00	64.1	403.	16.772	7.00	248.0	1560.	12.772
3.05	65.7	413.	16.722	7.05	250.8	1577.	12.722
3.10	67.3	423.	16.672	7.10	253.6	1595.	12.672
3.15	69.0	434.	16.622	7.15	256.5	1613.	12.622
3.20	70.7	444.	16.572	7.20	259.3	1631.	12.572
3.25	72.4	455.	16.522	7.25	262.1	1648.	12.522
3.30	74.1	466.	16.472	7.30	265.0	1666.	12.472
3.35	75.8	477.	16.422	7.35	267.8	1684.	12.422
3.40	77.5	488.	16.372	7.40	270.7	1702.	12.372
3.45	79.3	499.	16.322	7.45	273.5	1720.	12.322
3.50	81.1	510.	16.272	7.50	276.4	1738.	12.272
3.55	82.9	521.	16.222	7.55	278.8	1753.	12.222
3.60	84.7	533.	16.172	7.60	280.1	1762.	12.172
3.65	86.5	544.	16.122	7.65	281.4	1770.	12.122
3.70	88.4	556.	16.072	7.70	282.8	1778.	12.072
3.75	90.3	568.	16.022	7.75	284.1	1787.	12.022
3.80	92.2	580.	15.972	7.80	285.4	1795.	11.972
3.85	94.1	592.	15.922	7.85	286.8	1804.	11.922
3.90	96.1	604.	15.872	7.90	288.1	1812.	11.872
3.95	98.1	617.	15.822	7.95	289.5	1820.	11.822

DEEP F.O.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
8.00	290.8	1829.	11.772	12.00	377.6	2375.	7.772
8.05	292.2	1837.	11.722	12.05	378.5	2380.	7.722
8.10	293.5	1846.	11.672	12.10	379.3	2386.	7.672
8.15	294.9	1855.	11.622	12.15	380.2	2391.	7.622
8.20	296.2	1863.	11.572	12.20	381.0	2396.	7.572
8.25	297.6	1872.	11.522	12.25	381.9	2402.	7.522
8.30	299.0	1880.	11.472	12.30	382.7	2407.	7.472
8.35	300.3	1889.	11.422	12.35	383.6	2412.	7.422
8.40	301.7	1897.	11.372	12.40	384.5	2418.	7.372
8.45	303.1	1906.	11.322	12.45	385.3	2423.	7.322
8.50	304.4	1915.	11.272	12.50	386.2	2429.	7.272
8.55	305.8	1923.	11.222	12.55	387.0	2434.	7.222
8.60	307.2	1932.	11.172	12.60	387.9	2439.	7.172
8.65	308.6	1940.	11.122	12.65	388.7	2445.	7.122
8.70	309.9	1949.	11.072	12.70	389.6	2450.	7.072
8.75	311.3	1958.	11.022	12.75	390.4	2456.	7.022
8.80	312.7	1966.	10.972	12.80	391.3	2461.	6.972
8.85	314.1	1975.	10.922	12.85	392.2	2466.	6.922
8.90	315.4	1984.	10.872	12.90	393.0	2472.	6.872
8.95	316.8	1993.	10.822	12.95	393.9	2477.	6.822
9.00	318.2	2001.	10.772	13.00	394.7	2482.	6.772
9.05	319.6	2010.	10.722	13.05	395.6	2488.	6.722
9.10	321.0	2019.	10.672	13.10	396.4	2493.	6.672
9.15	322.4	2027.	10.622	13.15	397.3	2499.	6.622
9.20	323.7	2036.	10.572	13.20	398.1	2504.	6.572
9.25	325.1	2045.	10.522	13.25	399.0	2509.	6.522
9.30	326.5	2053.	10.472	13.30	399.7	2514.	6.472
9.35	327.9	2062.	10.422	13.35	400.5	2519.	6.422
9.40	329.3	2071.	10.372	13.40	401.3	2524.	6.372
9.45	330.7	2080.	10.322	13.45	402.1	2529.	6.322
9.50	332.1	2088.	10.272	13.50	402.9	2534.	6.272
9.55	333.5	2097.	10.222	13.55	403.6	2538.	6.222
9.60	334.9	2106.	10.172	13.60	404.4	2543.	6.172
9.65	336.2	2115.	10.122	13.65	405.2	2548.	6.122
9.70	337.6	2123.	10.072	13.70	406.0	2553.	6.072
9.75	339.0	2132.	10.022	13.75	406.7	2558.	6.022
9.80	340.0	2138.	9.972	13.80	407.5	2563.	5.972
9.85	340.8	2143.	9.922	13.85	408.3	2568.	5.922
9.90	341.7	2149.	9.872	13.90	409.1	2573.	5.872
9.95	342.5	2154.	9.822	13.95	409.9	2578.	5.822
10.00	343.4	2160.	9.772	14.00	410.6	2582.	5.772
10.05	344.2	2165.	9.722	14.05	411.4	2587.	5.722
10.10	345.1	2170.	9.672	14.10	412.2	2592.	5.672
10.15	346.0	2176.	9.622	14.15	413.0	2597.	5.622
10.20	346.8	2181.	9.572	14.20	413.7	2602.	5.572
10.25	347.7	2187.	9.522	14.25	414.5	2607.	5.522
10.30	348.5	2192.	9.472	14.30	415.3	2612.	5.472
10.35	349.4	2197.	9.422	14.35	416.1	2617.	5.422
10.40	350.2	2203.	9.372	14.40	416.9	2622.	5.372
10.45	351.1	2208.	9.322	14.45	417.8	2628.	5.322
10.50	351.9	2213.	9.272	14.50	418.7	2633.	5.272
10.55	352.8	2219.	9.222	14.55	419.5	2638.	5.222
10.60	353.7	2224.	9.172	14.60	420.4	2644.	5.172
10.65	354.5	2230.	9.122	14.65	421.2	2649.	5.122
10.70	355.4	2235.	9.072	14.70	422.1	2654.	5.072
10.75	356.2	2240.	9.022	14.75	422.9	2660.	5.022
10.80	357.1	2246.	8.972	14.80	423.8	2665.	4.972
10.85	357.9	2251.	8.922	14.85	424.6	2671.	4.922
10.90	358.8	2256.	8.872	14.90	425.5	2676.	4.872
10.95	359.6	2262.	8.822	14.95	426.3	2681.	4.822
11.00	360.5	2267.	8.772	15.00	427.2	2687.	4.772
11.05	361.4	2273.	8.722	15.05	428.1	2692.	4.722
11.10	362.2	2278.	8.672	15.10	428.9	2697.	4.672
11.15	363.1	2283.	8.622	15.15	429.8	2703.	4.622
11.20	363.9	2289.	8.572	15.20	430.6	2708.	4.572
11.25	364.8	2294.	8.522	15.25	431.5	2714.	4.522
11.30	365.6	2300.	8.472	15.30	432.3	2719.	4.472
11.35	366.5	2305.	8.422	15.35	433.2	2724.	4.422
11.40	367.3	2310.	8.372	15.40	434.1	2730.	4.372
11.45	368.2	2316.	8.322	15.45	434.9	2735.	4.322
11.50	369.1	2321.	8.272	15.50	435.8	2741.	4.272
11.55	369.9	2326.	8.222	15.55	436.6	2746.	4.222
11.60	370.8	2332.	8.172	15.60	437.5	2751.	4.172
11.65	371.6	2337.	8.122	15.65	438.3	2757.	4.122
11.70	372.5	2343.	8.072	15.70	439.2	2762.	4.072
11.75	373.3	2348.	8.022	15.75	440.0	2767.	4.022
11.80	374.2	2353.	7.972	15.80	440.9	2773.	3.972
11.85	375.0	2359.	7.922	15.85	441.7	2778.	3.922
11.90	375.9	2364.	7.872	15.90	442.6	2784.	3.872
11.95	376.8	2369.	7.822	15.95	443.5	2789.	3.822

DEEP F.O.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
16.00	444.3	2794.	3.772
16.05	445.2	2800.	3.722
16.10	446.0	2805.	3.672
16.15	446.9	2810.	3.622
16.20	447.7	2816.	3.572
16.25	448.6	2821.	3.522
16.30	449.4	2827.	3.472
16.35	450.3	2832.	3.422
16.40	451.1	2837.	3.372
16.45	452.0	2843.	3.322
16.50	452.9	2848.	3.272
16.55	453.7	2853.	3.222
16.60	454.6	2859.	3.172
16.65	455.4	2864.	3.122
16.70	456.3	2870.	3.072
16.75	457.1	2875.	3.022
16.80	458.0	2880.	2.972
16.85	458.9	2886.	2.922
16.90	459.7	2891.	2.872
16.95	460.6	2896.	2.822
17.00	461.4	2902.	2.772
17.05	462.3	2907.	2.722
17.10	463.1	2913.	2.673
17.15	464.0	2918.	2.623
17.20	464.8	2923.	2.573
17.25	465.7	2929.	2.523
17.30	466.5	2934.	2.473
17.35	467.4	2939.	2.423
17.40	468.3	2945.	2.373
17.45	469.1	2950.	2.323
17.50	470.0	2956.	2.273
17.55	470.8	2961.	2.223
17.60	471.7	2966.	2.173
17.65	472.5	2972.	2.123
17.70	473.4	2977.	2.073
17.75	474.2	2982.	2.023
17.80	475.1	2988.	1.973
17.85 OVER FLOW	475.9	2993.	1.923
17.90 PIPE	476.8	2999.	1.873
17.95	477.7	3004.	1.823

H.F.O.SETT.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
0.0	0.0 (0.1)	0 (1.)	7.980	1.60	35.3	222.	6.380
0.02	0.2	1.	7.960	1.62	35.9	226.	6.360
0.04	0.3	2.	7.940	1.64	36.5	230.	6.340
0.06	0.5	3.	7.920	1.66	37.1	233.	6.320
0.08	0.6	4.	7.900	1.68	37.7	237.	6.300
0.10	0.7	5.	7.880	1.70	38.4	241.	6.280
0.12	0.8	5.	7.860	1.72	39.0	245.	6.260
0.14	1.0	6.	7.840	1.74	39.6	249.	6.240
0.16	1.1	7.	7.820	1.76	40.2	253.	6.220
0.18	1.2	8.	7.800	1.78	40.8	257.	6.200
0.20	1.3	8.	7.780	1.80	41.5	261.	6.180
0.22	1.5	9.	7.760	1.82	42.1	265.	6.160
0.24	1.6	10.	7.740	1.84	42.7	268.	6.140
0.26	1.7	11.	7.720	1.86	43.3	272.	6.120
0.28	1.8	12.	7.700	1.88	43.9	276.	6.100
0.30	2.0	12.	7.680	1.90	44.5	280.	6.080
0.32	2.1	13.	7.660	1.92	45.2	284.	6.060
0.34	2.2	14.	7.640	1.94	45.8	288.	6.040
0.36	2.3	15.	7.620	1.96	46.4	292.	6.020
0.38	2.4	15.	7.600	1.98	47.0	296.	6.000
0.40	2.6	16.	7.580	2.00	47.6	300.	5.980
0.42	2.8	17.	7.560	2.02	48.3	304.	5.960
0.44	3.0	19.	7.540	2.04	48.9	307.	5.940
0.46	3.2	20.	7.520	2.06	49.5	311.	5.920
0.48	3.4	21.	7.500	2.08	50.1	315.	5.900
0.50	3.7	23.	7.480	2.10	50.7	319.	5.860
0.52	4.0	25.	7.460	2.12	51.4	323.	5.860
0.54	4.3	27.	7.440	2.14	52.0	327.	5.840
0.56	4.6	29.	7.420	2.16	52.6	331.	5.820
0.58	5.0	31.	7.400	2.18	53.2	335.	5.800
0.60	5.4	34.	7.380	2.20	53.8	339.	5.780
0.62	5.9	37.	7.360	2.22	54.5	342.	5.760
0.64	6.4	40.	7.340	2.24	55.1	346.	5.740
0.66	6.9	43.	7.320	2.26	55.7	350.	5.720
0.68	7.4	46.	7.300	2.28	56.3	354.	5.700
0.70	7.9	50.	7.280	2.30	56.9	358.	5.680
0.72	8.4	53.	7.260	2.32	57.5	362.	5.660
0.74	8.9	56.	7.240	2.34	58.2	366.	5.640
0.76	9.3	59.	7.220	2.36	58.8	370.	5.620
0.78	9.9	62.	7.200	2.38	59.4	374.	5.600
0.80	10.5	66.	7.180	2.40	60.0	377.	5.580
0.82	11.1	70.	7.160	2.42	60.6	381.	5.560
0.84	11.7	74.	7.140	2.44	61.3	385.	5.540
0.86	12.4	78.	7.120	2.46	61.9	389.	5.520
0.88	13.0	82.	7.100	2.48	62.5	393.	5.500
0.90	13.6	85.	7.080	2.50	63.1	397.	5.480
0.92	14.2	89.	7.060	2.52	63.7	401.	5.460
0.94	14.8	93.	7.040	2.54	64.4	405.	5.440
0.96	15.4	97.	7.020	2.56	65.0	409.	5.420
0.98	16.1	101.	7.000	2.58	65.6	413.	5.400
1.00	16.7	105.	6.980	2.60	66.2	416.	5.380
1.02	17.3	109.	6.960	2.62	66.8	420.	5.360
1.04	17.9	113.	6.940	2.64	67.5	424.	5.340
1.06	18.5	117.	6.920	2.66	68.1	428.	5.320
1.08	19.2	121.	6.900	2.68	68.7	432.	5.300
1.10	19.8	124.	6.880	2.70	69.3	436.	5.280
1.12	20.4	128.	6.860	2.72	69.9	440.	5.260
1.14	21.0	132.	6.840	2.74	70.5	444.	5.240
1.16	21.6	136.	6.820	2.76	71.2	448.	5.220
1.18	22.3	140.	6.800	2.78	71.8	451.	5.200
1.20	22.9	144.	6.780	2.80	72.4	455.	5.180
1.22	23.5	148.	6.760	2.82	73.0	459.	5.160
1.24	24.1	152.	6.740	2.84	73.6	463.	5.140
1.26	24.7	156.	6.720	2.86	74.3	467.	5.120
1.28	25.4	159.	6.700	2.88	74.9	471.	5.100
1.30	26.0	163.	6.680	2.90	75.5	475.	5.080
1.32	26.6	167.	6.660	2.92	76.1	479.	5.060
1.34	27.2	171.	6.640	2.94	76.7	483.	5.040
1.36	27.8	175.	6.620	2.96	77.4	487.	5.020
1.38	28.5	179.	6.600	2.98	78.0	490.	5.000
1.40	29.1	183.	6.580	3.00	78.6	494.	4.980
1.42	29.7	187.	6.560	3.02	79.2	498.	4.960
1.44	30.3	191.	6.540	3.04	79.8	502.	4.940
1.46	30.9	195.	6.520	3.06	80.5	506.	4.920
1.48	31.6	198.	6.500	3.08	81.1	510.	4.900
1.50	32.2	202.	6.480	3.10	81.7	514.	4.880
1.52	32.8	206.	6.460	3.12	82.3	518.	4.860
1.54	33.4	210.	6.440	3.14	82.9	522.	4.840
1.56	34.0	214.	6.420	3.16	83.6	525.	4.820
1.58	34.6	218.	6.400	3.18	84.2	529.	4.800

H.F.O.SETT.TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
3.20	84.8	533.	4.780
3.22	85.4	537.	4.760
3.24	86.0	541.	4.740
3.26	86.7	545.	4.720
3.28	87.3	549.	4.700
3.30	87.9	553.	4.680
3.32	88.5	557.	4.660
3.34	89.1	561.	4.640
3.36	89.7	564.	4.620
3.38	90.4	568.	4.600
3.40	91.0	572.	4.580
3.42	91.6	576.	4.560
3.44	92.2	580.	4.540
3.46	92.8	584.	4.520
3.48	93.5	588.	4.500
3.50	94.1	592.	4.480
3.52	94.7	596.	4.460
3.54	95.3	599.	4.440
3.56	95.9	603.	4.420
3.58	96.6	607.	4.400
3.60	97.2	611.	4.380
3.62	97.8	615.	4.360
3.64	98.4	619.	4.340
3.66	99.0	623.	4.320
3.68	99.6	627.	4.300
3.70	100.3	631.	4.280
3.72	100.9	634.	4.260
3.74	101.5	638.	4.240
3.76	102.1	642.	4.220
3.78	102.7	646.	4.200
3.80	103.4	650.	4.180
3.82	104.0	654.	4.160
3.84	104.6	658.	4.140
3.86	105.2	662.	4.120
3.88	105.8	666.	4.100
3.90	106.5	670.	4.080
3.92	107.1	673.	4.060
3.94	107.7	677.	4.040
3.96	108.3	681.	4.020
3.98	108.9	685.	4.000
4.00	109.6	689.	3.980
4.02	110.2	693.	3.960
4.04	110.8	697.	3.940
4.06	111.4	701.	3.920
4.08	112.0	705.	3.900
4.10	112.6	708.	3.880
4.12	113.3	712.	3.860
4.14	113.9	716.	3.840
4.16	114.5	720.	3.820
4.18	115.1	724.	3.800
4.20	115.7	728.	3.780
4.22	116.4	732.	3.760
4.24	117.0	736.	3.740
4.26	117.6	740.	3.720
4.28 OVER FLOW	118.2	743.	3.700
4.30 PIPE	118.8	747.	3.680
4.32	119.5	751.	3.660

H.F.O.SETT.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
0.0	0.0	0.	7.980
0.02	0.1	1.	7.960
0.04	0.2	1.	7.940
0.06	0.2	1.	7.920
0.08	0.3	2.	7.900
0.10	0.3	2.	7.880
0.12	0.4	2.	7.860
0.14	0.4	3.	7.840
0.16	0.5	3.	7.820
0.18	0.5	3.	7.800
0.20	0.6	4.	7.780
0.22	0.7	4.	7.760
0.24	0.7	5.	7.740
0.26	0.8	5.	7.720
0.28	0.8	5.	7.700
0.30	0.9	6.	7.680
0.32	0.9	6.	7.660
0.34	1.0	6.	7.640
0.36	1.1	7.	7.620
0.38	1.1	7.	7.600
0.40	1.2	7.	7.580
0.42	1.3	8.	7.560
0.44	1.3	8.	7.540
0.46	1.4	9.	7.520
0.48	1.6	10.	7.500
0.50	1.7	11.	7.480
0.52	1.8	11.	7.460
0.54	1.9	12.	7.440
0.56	2.1	13.	7.420
0.58	2.3	14.	7.400
0.60	2.5	16.	7.380
0.62	2.7	17.	7.360
0.64	2.9	18.	7.340
0.66	3.1	20.	7.320
0.68	3.4	21.	7.300
0.70	3.6	23.	7.280
0.72	3.8	24.	7.260
0.74	4.0	25.	7.240
0.76	4.3	27.	7.220
0.78	4.5	28.	7.200
0.80	4.8	30.	7.180
0.82	5.1	32.	7.160
0.84	5.3	34.	7.140
0.86	5.6	35.	7.120
0.88	5.9	37.	7.100
0.90	6.2	39.	7.080
0.92	6.5	41.	7.060
0.94	6.8	43.	7.040
0.96	7.0	44.	7.020
0.98	7.3	46.	7.000
1.00	7.6	48.	6.980
1.02	7.9	50.	6.960
1.04	[illegible]	51.	6.940
1.06	8.5	53.	6.920
1.08	8.7	55.	6.900
1.10	9.0	57.	6.880
1.12	9.3	58.	6.860
1.14	9.6	60.	6.840
1.16	9.9	62.	6.820
1.18	10.1	64.	6.800
1.20	10.4	66.	6.780
1.22	10.7	67.	6.760
1.24	11.0	69.	6.740
1.26	11.3	71.	6.720
1.28	11.6	73.	6.700
1.30	11.8	74.	6.680
1.32	12.1	76.	6.660
1.34	12.4	78.	6.640
1.36	12.7	80.	6.620
1.38	13.0	82.	6.600
1.40	13.2	83.	6.580
1.42	13.5	85.	6.560
1.44	13.8	87.	6.540
1.46	14.1	89.	6.520
1.48	14.4	90.	6.500
1.50	14.7	92.	6.480
1.52	14.9	94.	6.460
1.54	15.2	96.	6.440
1.56	15.5	97.	6.420
1.58	15.8	99.	6.400
1.60	16.1	101.	6.380
1.62	16.3	103.	6.360
1.64	16.6	105.	6.340
1.66	16.9	106.	6.320
1.68	17.2	108.	6.300
1.70	17.5	110.	6.280
1.72	17.8	112.	6.260
1.74	18.0	113.	6.240
1.76	18.3	115.	6.220
1.78	18.6	117.	6.200
1.80	18.9	119.	6.180
1.82	19.2	121.	6.160
1.84	19.4	122.	6.140
1.86	19.7	124.	6.120
1.88	20.0	126.	6.100
1.90	20.3	128.	6.080
1.92	20.6	129.	6.060
1.94	20.9	131.	6.040
1.96	21.1	133.	6.020
1.98	21.4	135.	6.000
2.00	21.7	137.	5.980
2.02	22.0	139.	5.960
2.04	22.3	140.	5.940
2.06	22.6	142.	5.920
2.08	22.9	144.	5.900
2.10	23.2	146.	5.880
2.12	23.5	148.	5.860
2.14	23.7	149.	5.840
2.16	24.0	151.	5.820
2.18	24.3	153.	5.800
2.20	24.7	155.	5.780
2.22	25.2	158.	5.760
2.24	25.6	161.	5.740
2.26	26.1	164.	5.720
2.28	26.6	168.	5.700
2.30	27.1	171.	5.680
2.32	27.6	174.	5.660
2.34	28.1	177.	5.640
2.36	28.6	180.	5.620
2.38	29.1	183.	5.600
2.40	29.6	186.	5.580
2.42	30.1	189.	5.560
2.44	30.6	192.	5.540
2.46	31.1	196.	5.520
2.48	31.6	199.	5.500
2.50	32.1	202.	5.480
2.52	32.6	205.	5.460
2.54	33.1	208.	5.440
2.56	33.6	211.	5.420
2.58	34.1	214.	5.400
2.60	34.6	217.	5.380
2.62	35.1	221.	5.360
2.64	35.6	224.	5.340
2.66	36.1	227.	5.320
2.68	36.6	230.	5.300
2.70	37.1	233.	5.280
2.72	37.6	236.	5.260
2.74	38.0	239.	5.240
2.76	38.5	242.	5.220
2.78	39.0	246.	5.200
2.80	39.5	249.	5.180
2.82	40.0	252.	5.160
2.84	40.5	255.	5.140
2.86	41.0	258.	5.120
2.88	41.5	261.	5.100
2.90	42.0	264.	5.080
2.92	42.5	267.	5.060
2.94	43.0	270.	5.040
2.96	43.5	274.	5.020
2.98	44.0	277.	5.000
3.00	44.5	280.	4.980
3.02	45.0	283.	4.960
3.04	45.5	286.	4.940
3.06	46.0	289.	4.920
3.08	46.5	292.	4.900
3.10	47.0	295.	4.880
3.12	47.5	299.	4.860
3.14	48.0	302.	4.840
3.16	48.5	305.	4.820
3.18	49.0	308.	4.800

H.F.O.SETT.TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
3.20	49.5	311.	4.780
3.22	50.0	314.	4.760
3.24	50.4	317.	4.740
3.26	50.9	320.	4.720
3.28	51.4	324.	4.700
3.30	51.9	327.	4.680
3.32	52.4	330.	4.660
3.34	52.9	333.	4.640
3.36	53.4	336.	4.620
3.38	53.9	339.	4.600
3.40	54.4	342.	4.580
3.42	54.9	345.	4.560
3.44	55.4	348.	4.540
3.46	55.9	352.	4.520
3.48	56.4	355.	4.500
3.50	56.9	358.	4.480
3.52	57.4	361.	4.460
3.54	57.9	364.	4.440
3.56	58.4	367.	4.420
3.58	58.9	370.	4.400
3.60	59.4	373.	4.380
3.62	59.9	377.	4.360
3.64	60.4	380.	4.340
3.66	60.9	383.	4.320
3.68	61.4	386.	4.300
3.70	61.9	389.	4.280
3.72	62.4	392.	4.260
3.74	62.8	395.	4.240
3.76	63.3	398.	4.220
3.78	63.8	401.	4.200
3.80	64.3	405.	4.180
3.82	64.8	408.	4.160
3.84	65.3	411.	4.140
3.86	65.8	414.	4.120
3.88	66.3	417.	4.100
3.90	66.8	420.	4.080
3.92	67.3	423.	4.060
3.94	67.8	426.	4.040
3.96	68.3	430.	4.020
3.98	68.8	433.	4.000
4.00	69.3	436.	3.980
4.02	69.8	439.	3.960
4.04	70.3	442.	3.940
4.06	70.8	445.	3.920
4.08	71.3	448.	3.900
4.10	71.8	451.	3.880
4.12	72.3	455.	3.860
4.14	72.8	458.	3.840
4.16	73.3	461.	3.820
4.18	73.8	464.	3.800
4.20	74.3	467.	3.780
4.22	74.8	470.	3.760
4.24	75.2	473.	3.740
4.26	75.7	476.	3.720
4.28	76.2	479.	3.700
4.30	76.7	483.	3.680
4.32	77.2	486.	3.660
4.34	77.7	489.	3.640
4.36	78.2	492.	3.620
4.38	78.7	495.	3.600
4.40	79.2	498.	3.580
4.42	79.7	501.	3.560
4.44	80.2	504.	3.540
4.46	80.7	508.	3.520
4.48	81.2	511.	3.500
4.50	81.7	514.	3.480
4.52	82.2	517.	3.460
4.54	82.7	520.	3.440
4.56	83.2	523.	3.420
4.58	83.7	526.	3.400
4.60	84.2	529.	3.380
4.62	84.7	532.	3.360
4.64	85.2	536.	3.340
4.66	85.7	539.	3.320
4.68	86.2	542.	3.300
4.70	86.7	545.	3.280
4.72	87.2	548.	3.260
4.74	87.6	551.	3.240
4.76	88.1	554.	3.220
4.78	88.6	557.	3.200
4.80	89.1	561.	3.180
4.82	89.6	564.	3.160
4.84	90.1	567.	3.140
4.86	90.6	570.	3.120
4.88	91.1	573.	3.100
4.90	91.6	576.	3.080
4.92	92.1	579.	3.060
4.94	92.6	582.	3.040
4.96	93.1	586.	3.020
4.98	93.6	589.	3.000
5.00	94.1	592.	2.980
5.02	94.6	595.	2.960
5.04	95.1	598.	2.940
5.06	95.6	601.	2.920
5.08	96.1	604.	2.900
5.10	96.6	607.	2.880
5.12	97.1	610.	2.860
5.14	97.6	614.	2.840
5.16	98.1	617.	2.820
5.18	98.5	620.	2.800
5.20	99.0	623.	2.780
5.22	99.5	626.	2.760
5.24	100.0	629.	2.740
5.26	100.5	632.	2.720
5.28	101.0	635.	2.700
5.30	101.5	638.	2.680
5.32	102.0	642.	2.660
5.34	102.5	645.	2.640
5.36	103.0	648.	2.620
5.38	103.5	651.	2.600
5.40	104.0	654.	2.580
5.42	104.5	657.	2.560
5.44	105.0	660.	2.540
5.46	105.5	663.	2.520
5.48	106.0	667.	2.500
5.50	106.5	670.	2.480
5.52	107.0	673.	2.460
5.54	107.5	676.	2.440
5.56	108.0	679.	2.420
5.58	108.5	682.	2.400
5.60	109.0	685.	2.380
5.62	109.5	688.	2.360
5.64	110.0	692.	2.340
5.66	110.5	695.	2.320
5.68	110.9	698.	2.300
5.70	111.4	701.	2.280
5.72	111.9	704.	2.260
5.74	112.4	707.	2.240
5.76	112.9	710.	2.220
5.78	113.4	713.	2.200
5.80	113.9	716.	2.180
5.82	114.4	720.	2.160
5.84	114.9	723.	2.140
5.86	115.4	726.	2.120
5.88	115.9	729.	2.100
5.90	116.4	732.	2.080
5.92	116.9	735.	2.060
5.94 OVER FLOW	117.4	738.	2.040
5.96 PIPE	117.9	741.	2.020
5.98	118.4	745.	2.000

H.F.O.SERV.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
0.0	0.0 (0.1)	0.	10.040
0.02	0.1	1.	10.020
0.04	0.2	1.	10.000
0.06	0.3	2.	9.980
0.08	0.3	2.	9.960
0.10	0.4	2.	9.940
0.12	0.5	3.	9.920
0.14	0.5	3.	9.900
0.16	0.6	4.	9.880
0.18	0.7	4.	9.860
0.20	0.7	5.	9.840
0.22	0.8	5.	9.820
0.24	0.9	5.	9.800
0.26	0.9	6.	9.780
0.28	1.0	6.	9.760
0.30	1.1	7.	9.740
0.32	1.1	7.	9.720
0.34	1.2	8.	9.700
0.36	1.3	8.	9.680
0.38	1.3	8.	9.660
0.40	1.4	9.	9.640
0.42	1.5	9.	9.620
0.44	1.6	10.	9.600
0.46	1.7	11.	9.580
0.48	1.8	12.	9.560
0.50	2.0	13.	9.540
0.52	2.1	13.	9.520
0.54	2.3	15.	9.500
0.56	2.5	16.	9.480
0.58	2.7	17.	9.460
0.60	2.9	19.	9.440
0.62	3.2	20.	9.420
0.64	3.5	22.	9.400
0.66	3.7	24.	9.380
0.68	4.0	25.	9.360
0.70	4.3	27.	9.340
0.72	4.5	29.	9.320
0.74	4.8	30.	9.300
0.76	5.1	32.	9.280
0.78	5.4	34.	9.260
0.80	5.7	36.	9.240
0.82	6.0	38.	9.220
0.84	6.4	40.	9.200
0.86	6.7	42.	9.180
0.88	7.0	44.	9.160
0.90	7.4	46.	9.140
0.92	7.7	49.	9.120
0.94	8.1	51.	9.100
0.96	8.4	53.	9.080
0.98	8.7	55.	9.060
1.00	9.1	57.	9.040
1.02	9.4	59.	9.020
1.04	9.7	61.	9.000
1.06	10.1	63.	8.980
1.08	10.4	66.	8.960
1.10	10.8	68.	8.940
1.12	11.1	70.	8.920
1.14	11.4	72.	8.900
1.16	11.8	74.	8.880
1.18	12.1	76.	8.860
1.20	12.4	78.	8.840
1.22	12.8	80.	8.820
1.24	13.1	82.	8.800
1.26	13.5	85.	8.780
1.28	13.8	87.	8.760
1.30	14.1	89.	8.740
1.32	14.5	91.	8.720
1.34	14.8	93.	8.700
1.36	15.1	95.	8.680
1.38	15.5	97.	8.660
1.40	15.8	99.	8.640
1.42	16.1	102.	8.620
1.44	16.5	104.	8.600
1.46	16.8	106.	8.580
1.48	17.2	108.	8.560
1.50	17.5	110.	8.540
1.52	17.8	112.	8.520
1.54	18.2	114.	8.500
1.56	18.5	116.	8.480
1.58	18.8	118.	8.460
1.60	19.2	121.	8.440
1.62	19.5	123.	8.420
1.64	19.9	125.	8.400
1.66	20.2	127.	8.380
1.68	20.5	129.	8.360
1.70	20.9	131.	8.340
1.72	21.2	133.	8.320
1.74	21.5	135.	8.300
1.76	21.9	138.	8.280
1.78	22.2	140.	8.260
1.80	22.5	142.	8.240
1.82	22.9	144.	8.220
1.84	23.2	146.	8.200
1.86	23.6	148.	8.180
1.88	23.9	150.	8.160
1.90	24.2	152.	8.140
1.92	24.6	155.	8.120
1.94	24.9	157.	8.100
1.96	25.2	159.	8.080
1.98	25.6	161.	8.060
2.00	25.9	163.	8.040
2.02	26.3	165.	8.020
2.04	26.6	167.	8.000
2.06	26.9	169.	7.980
2.08	27.3	171.	7.960
2.10	27.6	174.	7.940
2.12	27.9	176.	7.920
2.14	28.3	178.	7.900
2.16	28.6	180.	7.880
2.18	29.0	182.	7.860
2.20	29.3	184.	7.840
2.22	29.6	186.	7.820
2.24	30.0	188.	7.800
2.26	30.3	191.	7.780
2.28	30.6	193.	7.760
2.30	31.0	195.	7.740
2.32	31.3	197.	7.720
2.34	31.6	199.	7.700
2.36	32.0	201.	7.680
2.38	32.3	203.	7.660
2.40	32.7	205.	7.640
2.42	33.0	208.	7.620
2.44	33.3	210.	7.600
2.46	33.7	212.	7.580
2.48	34.0	214.	7.560
2.50	34.3	216.	7.540
2.52	34.7	218.	7.520
2.54	35.0	220.	7.500
2.56	35.4	222.	7.480
2.58	35.7	224.	7.460
2.60	36.0	227.	7.440
2.62	36.4	229.	7.420
2.64	36.7	231.	7.400
2.66	37.0	233.	7.380
2.68	37.4	235.	7.360
2.70	37.7	237.	7.340
2.72	38.1	239.	7.320
2.74	38.4	241.	7.300
2.76	38.7	244.	7.280
2.78	39.1	246.	7.260
2.80	39.4	248.	7.240
2.82	39.7	250.	7.220
2.84	40.1	252.	7.200
2.86	40.4	254.	7.180
2.88	40.7	256.	7.160
2.90	41.1	258.	7.140
2.92	41.4	260.	7.120
2.94	41.8	263.	7.100
2.96	42.1	265.	7.080
2.98	42.4	267.	7.060
3.00	42.8	269.	7.040
3.02	43.1	271.	7.020
3.04	43.4	273.	7.000
3.06	43.8	275.	6.980
3.08	44.1	277.	6.960
3.10	44.5	280.	6.940
3.12	44.8	282.	6.920
3.14	45.1	284.	6.900
3.16	45.5	286.	6.880
3.18	45.8	288.	6.860

H.F.O.SERV.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
3.20	46.1	290.	6.840	4.80	73.1	460.	5.240
3.22	46.5	292.	6.820	4.82	73.4	462.	5.220
3.24	46.8	294.	6.800	4.84	73.8	464.	5.200
3.26	47.1	297.	6.780	4.86	74.1	466.	5.180
3.28	47.5	299.	6.760	4.88	74.4	468.	5.160
3.30	47.8	301.	6.740	4.90	74.8	470.	5.140
3.32	48.2	303.	6.720	4.92	75.1	472.	5.120
3.34	48.5	305.	6.700	4.94	75.5	475.	5.100
3.36	48.8	307.	6.680	4.96	75.8	477.	5.080
3.38	49.2	309.	6.660	4.98	76.1	479.	5.060
3.40	49.5	311.	6.640	5.00	76.5	481.	5.040
3.42	49.8	313.	6.620	5.02	76.8	483.	5.020
3.44	50.2	316.	6.600	5.04	77.1	485.	5.000
3.46	50.5	318.	6.580	5.06	77.5	487.	4.980
3.48	50.9	320.	6.560	5.08	77.8	489.	4.960
3.50	51.2	322.	6.540	5.10	78.2	492.	4.940
3.52	51.5	324.	6.520	5.12	78.5	494.	4.920
3.54	51.9	326.	6.500	5.14	78.8	496.	4.900
3.56	52.2	328.	6.480	5.16	79.2	498.	4.880
3.58	52.5	330.	6.460	5.18	79.5	500.	4.860
3.60	52.9	333.	6.440	5.20	79.8	502.	4.840
3.62	53.2	335.	6.420	5.22	80.2	504.	4.820
3.64	53.6	337.	6.400	5.24	80.5	506.	4.800
3.66	53.9	339.	6.380	5.26	80.8	508.	4.780
3.68	54.2	341.	6.360	5.28	81.2	511.	4.760
3.70	54.6	343.	6.340	5.30	81.5	513.	4.740
3.72	54.9	345.	6.320	5.32	81.9	515.	4.720
3.74	55.2	347.	6.300	5.34	82.2	517.	4.700
3.76	55.6	350.	6.280	5.36	82.5	519.	4.680
3.78	55.9	352.	6.260	5.38	82.9	521.	4.660
3.80	56.2	354.	6.240	5.40	83.2	523.	4.640
3.82	56.6	356.	6.220	5.42	83.5	525.	4.620
3.84	56.9	358.	6.200	5.44	83.9	528.	4.600
3.86	57.3	360.	6.180	5.46	84.2	530.	4.580
3.88	57.6	362.	6.160	5.48	84.6	532.	4.560
3.90	57.9	364.	6.140	5.50	84.9	534.	4.540
3.92	58.3	366.	6.120	5.52	85.2	536.	4.520
3.94	58.6	369.	6.100	5.54	85.6	538.	4.500
3.96	58.9	371.	6.080	5.56	85.9	540.	4.480
3.98	59.3	373.	6.060	5.58	86.2	542.	4.460
4.00	59.6	375.	6.040	5.60	86.6	544.	4.440
4.02	60.0	377.	6.020	5.62	86.9	547.	4.420
4.04	60.3	379.	6.000	5.64	87.3	549.	4.400
4.06	60.6	381.	5.980	5.66	87.6	551.	4.380
4.08	61.0	383.	5.960	5.68	87.9	553.	4.360
4.10	61.3	386.	5.940	5.70	88.3	555.	4.340
4.12	61.6	388.	5.920	5.72	88.6	557.	4.320
4.14	62.0	390.	5.900	5.74	88.9	559.	4.300
4.16	62.3	392.	5.880	5.76	89.3	561.	4.280
4.18	62.7	394.	5.860	5.78	89.6	564.	4.260
4.20	63.0	396.	5.840	5.80	89.9	566.	4.240
4.22	63.3	398.	5.820	5.82	90.3	568.	4.220
4.24	63.7	400.	5.800	5.84	90.6	570.	4.200
4.26	64.0	402.	5.780	5.86	91.0	572.	4.180
4.28	64.3	405.	5.760	5.88	91.3	574.	4.160
4.30	64.7	407.	5.740	5.90	91.6	576.	4.140
4.32	65.0	409.	5.720	5.92	92.0	57[illegible].	4.120
4.34	65.3	411.	5.700	5.94	92.3	581.	4.100
4.36	65.7	413.	5.680	5.96	92.6	583.	4.080
4.38	66.0	415.	5.660	5.98	93.0	585.	4.060
4.40	66.4	417.	5.640	6.00	93.3	587.	4.040
4.42	66.7	419.	5.620	6.02	93.7	589.	4.020
4.44	67.0	422.	5.600	6.04	94.0	591.	4.000
4.46	67.4	424.	5.580	6.06	94.3	593.	3.980
4.48	67.7	426.	5.560	6.08	94.7	595.	3.960
4.50	68.0	428.	5.540	6.10	95.0	597.	3.940
4.52	68.4	430.	5.520	6.12	95.3	600.	3.920
4.54	68.7	432.	5.500	6.14	95.7	602.	3.900
4.56	69.1	434.	5.480	6.16	96.0	604.	3.880
4.58	69.4	436.	5.460	6.18	96.4	606.	3.860
4.60	69.7	439.	5.440	6.20	96.7	608.	3.840
4.62	70.1	441.	5.420	6.22	97.0	610.	3.820
4.64	70.4	443.	5.400	6.24	97.4	612.	3.800
4.66	70.7	445.	5.380	6.26	97.7	614.	3.780
4.68	71.1	447.	5.360	6.28	98.0	617.	3.760
4.70	71.4	449.	5.340	6.30	98.4	619.	3.740
4.72	71.7	451.	5.320	6.32	98.7	621.	3.720
4.74	72.1	453.	5.300	6.34	99.0	623.	3.700
4.76	72.4	455.	5.280	6.36	99.4	625.	3.680
4.78	72.8	458.	5.260	6.38	99.7	627.	3.660

H.F.O.SERV.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	ULLAGE DEPTH (M)
6.40	100.1	629.	3.640	7.82	119.4	751.	2.220
6.42	100.4	631.	3.620	7.84	119.7	753.	2.200
6.44	100.7	634.	3.600	7.86	119.9	754.	2.180
6.46	101.1	636.	3.580	7.88	120.2	756.	2.160
6.48	101.3	637.	3.560	7.90	120.5	758.	2.140
6.50	101.6	639.	3.540	7.92	120.7	759.	2.120
6.52	101.9	641.	3.520	7.94	121.0	761.	2.100
6.54	102.1	642.	3.500	7.96	121.3	763.	2.080
6.56	102.4	644.	3.480	7.98 OVER FLOW	121.6	764.	2.060
6.58	102.7	646.	3.460	8.00 PIPE	121.8	766.	2.040
6.60	103.0	647.	3.440	8.02	122.1	768.	2.020
6.62	103.2	649.	3.420				
6.64	103.5	651.	3.400				
6.66	103.8	653.	3.380				
6.68	104.0	654.	3.360				
6.70	104.3	656.	3.340				
6.72	104.6	658.	3.320				
6.74	104.8	659.	3.300				
6.76	105.1	661.	3.280				
6.78	105.4	663.	3.260				
6.80	105.7	664.	3.240				
6.82	105.9	666.	3.220				
6.84	106.2	668.	3.200				
6.86	106.5	670.	3.180				
6.88	106.7	671.	3.160				
6.90	107.0	673.	3.140				
6.92	107.3	675.	3.120				
6.94	107.5	676.	3.100				
6.96	107.8	678.	3.080				
6.98	108.1	680.	3.060				
7.00	108.3	681.	3.040				
7.02	108.6	683.	3.020				
7.04	108.9	685.	3.000				
7.06	109.2	686.	2.980				
7.08	109.4	688.	2.960				
7.10	109.7	690.	2.940				
7.12	110.0	692.	2.920				
7.14	110.2	693.	2.900				
7.16	110.5	695.	2.880				
7.18	110.8	697.	2.860				
7.20	111.0	698.	2.840				
7.22	111.3	700.	2.820				
7.24	111.6	702.	2.800				
7.26	111.8	703.	2.780				
7.28	112.1	705.	2.760				
7.30	112.4	707.	2.740				
7.32	112.7	708.	2.720				
7.34	112.9	710.	2.700				
7.36	113.2	712.	2.680				
7.38	113.5	714.	2.660				
7.40	113.7	715.	2.640				
7.42	114.0	717.	2.620				
7.44	114.3	719.	2.600				
7.46	1[illegible].5	720.	2.580				
7.48	1[illegible].8	722.	2.560				
7.50	115.1	724.	2.540				
7.52	115.4	725.	2.520				
7.54	115.6	727.	2.500				
7.56	115.9	729.	2.480				
7.58	116.2	731.	2.460				
7.60	116.4	732.	2.440				
7.62	116.7	734.	2.420				
7.64	117.0	736.	2.400				
7.66	117.2	737.	2.380				
7.68	117.5	739.	2.360				
7.70	117.8	741.	2.340				
7.72	118.1	742.	2.320				
7.74	118.3	744.	2.300				
7.76	118.6	746.	2.280				
7.78	118.9	748.	2.260				
7.80	119.1	749.	2.240				

F.O.DRAIN TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.3)	0 (2.)	0.80	22.2	139.
0.01	0.5	3.	0.81	22.5	141.
0.02	0.7	4.	0.82	22.8	143.
0.03	0.8	5.	0.83	23.1	145.
0.04	1.0	7.	0.84	23.4	147.
0.05	1.2	8.	0.85	23.7	149.
0.06	1.4	9.	0.86	24.0	151.
0.07	1.6	10.	0.87	24.3	153.
0.08	1.8	12.	0.88	24.6	154.
0.09	2.1	13.	0.89	24.8	156.
0.10	2.3	14.	0.90	25.1	158.
0.11	2.5	16.	0.91	25.3	159.
0.12	2.7	17.	0.92	25.6	161.
0.13	2.9	18.	0.93	25.9	163.
0.14	3.2	20.	0.94	26.1	164.
0.15	3.4	21.	0.95	26.4	166.
0.16	3.6	23.	0.96	26.7	168.
0.17	3.9	24.	0.97	26.9	169.
0.18	4.1	26.	0.98	27.2	171.
0.19	4.4	27.	0.99	27.4	173.
0.20	4.6	29.	1.00	27.7	174.
0.21	4.9	31.	1.01	28.0	176.
0.22	5.1	32.	1.02	28.2	178.
0.23	5.4	34.	1.03	28.5	179.
0.24	5.6	35.	1.04	28.8	181.
0.25	5.9	37.	1.05	29.0	182.
0.26	6.1	39.	1.06	29.3	184.
0.27	6.4	40.	1.07	29.5	186.
0.28	6.7	42.	1.08	29.8	187.
0.29	7.0	44.	1.09	30.1	189.
0.30	7.2	45.	1.10	30.3	191.
0.31	7.5	47.	1.11	30.6	192.
0.32	7.8	49.	1.12	30.9	194.
0.33	8.1	51.	1.13	31.1	196.
0.34	8.4	53.	1.14	31.4	197.
0.35	8.6	54.	1.15	31.6	199.
0.36	8.9	56.	1.16	31.9	201.
0.37	9.2	58.	1.17	32.2	202.
0.38	9.5	60.	1.18	32.4	204.
0.39	9.8	62.	1.19	32.7	206.
0.40	10.1	63.	1.20	33.0	207.
0.41	10.4	65.	1.21	33.2	209.
0.42	10.7	67.	1.22	33.5	211.
0.43	11.0	69.	1.23	33.8	212.
0.44	11.3	71.	1.24	34.0	214.
0.45	11.6	73.	1.25	34.3	216.
0.46	11.9	75.	1.26	34.5	217.
0.47	12.2	77.	1.27	34.8	219.
0.48	12.5	78.	1.28	35.1	221.
0.49	12.8	80.	1.29	35.3	222.
0.50	13.1	82.	1.30	35.6	224.
0.51	13.4	84.	1.31	35.8	225.
0.52	13.7	86.	1.32	36.1	227.
0.53	14.0	88.	1.33	36.4	229.
0.54	14.3	90.	1.34	36.6	230.
0.55	14.6	92.	1.35	36.9	232.
0.56	14.9	94.	1.36	37.2	234.
0.57	15.2	96.	1.37	37.4	235.
0.58	15.5	97.	1.38	37.7	237.
0.59	15.8	99.	1.39	37.9	239.
0.60	16.1	101.	1.40	38.2	240.
0.61	16.4	103.	1.41	38.5	242.
0.62	16.7	105.	1.42	38.7	244.
0.63	17.0	107.	1.43	39.0	245.
0.64	17.3	109.	1.44	39.3	247.
0.65	17.6	111.	1.45	39.5	249.
0.66	17.9	113.	1.46	39.8	250.
0.67	18.2	115.	1.47	40.1	252.
0.68	18.5	117.	1.48	40.3	254.
0.69	18.8	118.	1.49	40.6	255.
0.70	19.1	120.	1.50	40.8	257.
0.71	19.4	122.	1.51	41.1	259.
0.72	19.7	124.	1.52	41.4	260.
0.73	20.0	126.	1.53	41.6	262.
0.74	20.3	128.	1.54	41.9	263.
0.75	20.7	130.	1.55	42.2	265.
0.76	21.0	132.	1.56	42.4	267.
0.77	21.3	134.	1.57	42.7	268.
0.78	21.6	136.	1.58	42.9	270.
0.79	21.9	137.	1.59	43.2	272.

F.O.DRAIN TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
1.60	43.5	273.	2.40	56.3	354.
1.61	43.7	275.	2.41	56.4	354.
1.62	44.0	277.	2.42	56.4	355.
1.63	44.3	278.	2.43	56.4	355.
1.64	44.5	280.	2.44	56.4	355.
1.65	44.8	282.	2.45	56.5	355.
1.66	45.0	283.	2.46	56.5	355.
1.67	45.3	285.	2.47	56.5	355.
1.68	45.6	287.	2.48	56.5	355.
1.69	45.8	288.			
1.70	46.1	290.			
1.71	46.4	292.			
1.72	46.6	293.			
1.73	46.9	295.			
1.74	47.1	296.			
1.75	47.4	298.			
1.76	47.7	300.			
1.77	47.9	301.			
1.78	48.2	303.			
1.79	48.4	304.			
1.80	48.6	306.			
1.81	48.8	307.			
1.82	49.0	308.			
1.83	49.2	310.			
1.84	49.4	311.			
1.85	49.7	312.			
1.86	49.9	314.			
1.87	50.1	315.			
1.88	50.3	316.			
1.89	50.4	317.			
1.90	50.6	318.			
1.91	50.8	320.			
1.92	51.0	321.			
1.93	51.2	322.			
1.94	51.4	323.			
1.95	51.5	324.			
1.96	51.7	325.			
1.97	51.9	326.			
1.98	52.1	327.			
1.99	52.2	328.			
2.00	52.4	329.			
2.01	52.5	330.			
2.02	52.7	331.			
2.03	52.8	332.			
2.04	53.0	333.			
2.05	53.1	334.			
2.06	53.3	335.			
2.07	53.4	336.			
2.08	53.6	337.			
2.09	53.7	338.			
2.10	53.8	338.			
2.11	53.9	339.			
2.12	54.1	340.			
2.13	54.2	341.			
2.14	54.3	342.			
2.15	54.4	342.			
2.16	54.5	343.			
2.17	54.7	344.			
2.18	54.8	344.			
2.19	54.9	345.			
2.20	55.0	346.			
2.21	55.1	346.			
2.22	55.2	347.			
2.23	55.3	348.			
2.24	55.4	348.			
2.25	55.5	349.			
2.26	55.5	349.			
2.27	55.6	350.			
2.28	55.7	350.			
2.29	55.8	351.			
2.30	55.9	351.			
2.31	55.9	352.			
2.32	56.0	352.			
2.33	56.0	352.			
2.34	56.1	353.			
2.35	56.1	353.			
2.36	56.2	353.			
2.37	56.2	354.			
2.38	56.3	354.			
2.39	56.3	354.			

H.F.O.SLUDGE TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.1)	0.
0.01	0.1	1.
0.02	0.1	1.
0.03	0.2	1.
0.04	0.2	1.
0.05	0.2	2.
0.06	0.3	2.
0.07	0.3	2.
0.08	0.4	2.
0.09	0.4	2.
0.10	0.4	3.
0.11	0.5	3.
0.12	0.5	3.
0.13	0.5	3.
0.14	0.6	4.
0.15	0.6	4.
0.16	0.7	4.
0.17	0.7	4.
0.18	0.7	5.
0.19	0.8	5.
0.20	0.8	5.
0.21	0.8	5.
0.22	0.9	6.
0.23	0.9	6.
0.24	1.0	6.
0.25	1.0	6.
0.26	1.0	7.
0.27	1.1	7.
0.28	1.1	7.
0.29	1.2	7.
0.30	1.2	7.
0.31	1.2	8.
0.32	1.3	8.
0.33	1.3	8.
0.34	1.3	8.
0.35	1.4	9.
0.36	1.4	9.
0.37	1.4	9.
0.38	1.5	9.
0.39	1.5	10.
0.40	1.6	10.
0.41	1.6	10.
0.42	1.6	10.
0.43	1.7	11.
0.44 OVER FLOW PIPE	1.7	11.
0.45	1.8	11.
0.46	1.8	11.
0.47	1.8	11.

DIESEL OIL TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.2)	0 (1.)	0.80	15.0	94.
0.01	0.3	2.	0.81	15.3	96.
0.02	0.3	2.	0.82	15.5	98.
0.03	0.4	3.	0.83	15.8	99.
0.04	0.5	3.	0.84	16.1	101.
0.05	0.6	3.	0.85	16.4	103.
0.06	0.6	4.	0.86	16.6	105.
0.07	0.7	5.	0.87	16.9	106.
0.08	0.8	5.	0.88	17.2	108.
0.09	0.9	6.	0.89	17.5	110.
0.10	1.0	7.	0.90	17.8	112.
0.11	1.2	7.	0.91	18.1	114.
0.12	1.3	8.	0.92	18.4	116.
0.13	1.4	9.	0.93	18.7	118.
0.14	1.5	9.	0.94	19.0	119.
0.15	1.6	10.	0.95	19.3	121.
0.16	1.8	11.	0.96	19.6	123.
0.17	1.9	12.	0.97	19.9	125.
0.18	2.0	13.	0.98	20.2	127.
0.19	2.2	14.	0.99	20.5	129.
0.20	2.3	14.	1.00	20.8	131.
0.21	2.4	15.	1.01	21.2	133.
0.22	2.6	16.	1.02	21.5	135.
0.23	2.7	17.	1.03	21.8	137.
0.24	2.9	18.	1.04	22.1	139.
0.25	3.0	19.	1.05	22.5	141.
0.26	3.2	20.	1.06	22.8	143.
0.27	3.4	21.	1.07	23.1	146.
0.28	3.5	22.	1.08	23.5	148.
0.29	3.7	23.	1.09	23.8	150.
0.30	3.9	24.	1.10	24.2	152.
0.31	4.0	25.	1.11	24.5	154.
0.32	4.2	26.	1.12	24.9	156.
0.33	4.4	28.	1.13	25.2	159.
0.34	4.6	29.	1.14	25.6	161.
0.35	4.7	30.	1.15	25.9	163.
0.36	4.9	31.	1.16	26.2	165.
0.37	5.1	32.	1.17	26.5	167.
0.38	5.3	33.	1.18	26.8	169.
0.39	5.5	34.	1.19	27.1	170.
0.40	5.7	36.	1.20	27.4	172.
0.41	5.9	37.	1.21	27.7	174.
0.42	6.1	38.	1.22	28.0	176.
0.43	6.2	39.	1.23	28.3	178.
0.44	6.4	41.	1.24	28.7	180.
0.45	6.6	42.	1.25	29.0	182.
0.46	6.9	43.	1.26	29.3	184.
0.47	7.1	44.	1.27	29.6	186.
0.48	7.3	46.	1.28	30.0	188.
0.49	7.5	47.	1.29	30.3	190.
0.50	7.7	48.	1.30	30.6	193.
0.51	7.9	50.	1.31	31.0	195.
0.52	8.1	51.	1.32	31.3	197.
0.53	8.3	52.	1.33	31.6	199.
0.54	8.6	54.	1.34	32.0	201.
0.55	8.8	55.	1.35	32.3	203.
0.56	9.0	57.	1.36	32.7	206.
0.57	9.2	58.	1.37	33.1	208.
0.58	9.5	59.	1.38	33.4	210.
0.59	9.7	61.	1.39	33.8	212.
0.60	9.9	62.	1.40	34.1	215.
0.61	10.2	64.	1.41	34.5	217.
0.62	10.4	65.	1.42	34.9	219.
0.63	10.6	67.	1.43	35.2	222.
0.64	10.9	68.	1.44	35.6	224.
0.65	11.1	70.	1.45	36.0	226.
0.66	11.4	71.	1.46	36.4	229.
0.67	11.6	73.	1.47	36.8	231.
0.68	11.8	75.	1.48	37.2	234.
0.69	12.1	76.	1.49	37.6	236.
0.70	12.4	78.	1.50	37.9	239.
0.71	12.6	79.	1.51	38.3	241.
0.72	12.9	81.	1.52	38.7	244.
0.73	13.1	83.	1.53	39.1	246.
0.74	13.4	84.	1.54	39.5	249.
0.75	13.6	86.	1.55	40.0	251.
0.76	13.9	87.	1.56	40.4	254.
0.77	14.2	89.	1.57	40.8	256.
0.78	14.4	91.	1.58	41.2	259.
0.79	14.7	92.	1.59	41.6	262.

DIESEL OIL TK. (P)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
1.60	42.0	264.	2.40	84.4	531.
1.61	42.5	267.	2.41	85.0	535.
1.62	42.9	270.	2.42	85.6	538.
1.63	43.3	273.	2.43	86.1	542.
1.64	43.8	275.	2.44	86.7	545.
1.65	44.2	278.	2.45	86.7	545.
1.66	44.6	281.			
1.67	45.1	284.			
1.68	45.5	286.			
1.69	46.0	289.			
1.70	46.4	292.			
1.71	46.9	295.			
1.72	47.3	298.			
1.73	47.8	301.			
1.74	48.3	304.			
1.75	48.7	306.			
1.76	49.2	309.			
1.77	49.7	312.			
1.78	50.2	315.			
1.79	50.6	318.			
1.80	51.1	321.			
1.81	51.6	325.			
1.82	52.1	328.			
1.83	52.6	331.			
1.84	53.1	334.			
1.85	53.6	337.			
1.86	54.1	340.			
1.87	54.6	343.			
1.88	55.1	346.			
1.89	55.6	350.			
1.90	56.1	353.			
1.91	56.6	356.			
1.92	57.1	359.			
1.93	57.7	363.			
1.94	58.2	366.			
1.95	58.7	369.			
1.96	59.2	373.			
1.97	59.8	376.			
1.98	60.3	379.			
1.99	60.9	383.			
2.00	61.4	386.			
2.01	62.0	390.			
2.02	62.5	393.			
2.03	63.1	397.			
2.04	63.6	400.			
2.05	64.2	404.			
2.06	64.8	407.			
2.07	65.3	411.			
2.08	65.9	415.			
2.09	66.5	418.			
2.10	67.1	422.			
2.11	67.7	425.			
2.12	68.2	429.			
2.13	68.8	433.			
2.14	69.4	436.			
2.15	70.0	440.			
2.16	70.6	444.			
2.17	71.2	447.			
2.18	71.7	451.			
2.19	72.3	455.			
2.20	72.9	459.			
2.21	73.5	462.			
2.22	74.1	466.			
2.23	74.7	470.			
2.24	75.3	473.			
2.25	75.8	477.			
2.26	76.4	481.			
2.27	77.0	484.			
2.28	77.6	488.			
2.29	78.2	492.			
2.30	78.7	495.			
2.31	79.3	499.			
2.32	79.9	502.			
2.33	80.5	506.			
2.34	81.0	510.			
2.35	81.6	513.			
2.36	82.2	517.			
2.37	82.7	520.			
2.38	83.3	524.			
2.39	83.9	527.			

DIESEL OIL TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.1)	0.	0.80	17.0	107.
0.01	0.1	1.	0.81	17.4	109.
0.02	0.2	1.	0.82	17.7	112.
0.03	0.2	1.	0.83	18.1	114.
0.04	0.3	2.	0.84	18.4	116.
0.05	0.4	2.	0.85	18.8	118.
0.06	0.4	3.	0.86	19.2	121.
0.07	0.5	3.	0.87	19.5	123.
0.08	0.6	4.	0.88	19.9	125.
0.09	0.7	4.	0.89	20.3	127.
0.10	0.8	5.	0.90	20.6	130.
0.11	0.9	6.	0.91	21.0	132.
0.12	1.0	6.	0.92	21.4	135.
0.13	1.1	7.	0.93	21.8	137.
0.14	1.2	8.	0.94	22.2	139.
0.15	1.4	9.	0.95	22.5	142.
0.16	1.5	9.	0.96	22.9	144.
0.17	1.6	10.	0.97	23.3	147.
0.18	1.7	11.	0.98	23.7	149.
0.19	1.9	12.	0.99	24.1	152.
0.20	2.0	13.	1.00	24.5	154.
0.21	2.2	14.	1.01	24.9	157.
0.22	2.3	15.	1.02	25.3	159.
0.23	2.5	16.	1.03	25.7	162.
0.24	2.6	17.	1.04	26.1	164.
0.25	2.8	18.	1.05	26.5	167.
0.26	3.0	19.	1.06	26.9	169.
0.27	3.1	20.	1.07	27.3	172.
0.28	3.3	21.	1.08	27.8	175.
0.29	3.5	22.	1.09	28.2	177.
0.30	3.7	23.	1.10	28.6	180.
0.31	3.8	24.	1.11	29.0	183.
0.32	4.0	25.	1.12	29.4	185.
0.33	4.2	26.	1.13	29.9	188.
0.34	4.4	28.	1.14	30.3	191.
0.35	4.6	29.	1.15	30.7	193.
0.36	4.8	30.	1.16	31.2	196.
0.37	5.0	31.	1.17	31.6	199.
0.38	5.2	33.	1.18	32.0	201.
0.39	5.4	34.	1.19	32.5	204.
0.40	5.6	35.	1.20	32.9	207.
0.41	5.8	37.	1.21	33.3	210.
0.42	6.1	38.	1.22	33.8	212.
0.43	6.3	40.	1.23	34.2	215.
0.44	6.5	41.	1.24	34.6	218.
0.45	6.7	42.	1.25	35.1	221.
0.46	7.0	44.	1.26	35.5	223.
0.47	7.2	45.	1.27	36.0	226.
0.48	7.5	47.	1.28	36.4	229.
0.49	7.7	48.	1.29	36.9	232.
0.50	8.0	50.	1.30	37.3	235.
0.51	8.2	52.	1.31	37.8	238.
0.52	8.5	53.	1.32	38.2	241.
0.53	8.7	55.	1.33	38.7	243.
0.54	9.0	57.	1.34	39.2	246.
0.55	9.3	58.	1.35	39.6	249.
0.56	9.5	60.	1.36	40.1	252.
0.57	9.8	62.	1.37	40.5	255.
0.58	10.1	63.	1.38	41.0	258.
0.59	10.4	65.	1.39	41.5	261.
0.60	10.7	67.	1.40	41.9	264.
0.61	10.9	69.	1.41	42.4	267.
0.62	11.2	71.	1.42	42.9	270.
0.63	11.5	73.	1.43	43.3	273.
0.64	11.8	74.	1.44	43.8	276.
0.65	12.1	76.	1.45	44.3	279.
0.66	12.4	78.	1.46	44.8	282.
0.67	12.8	80.	1.47	45.2	285.
0.68	13.1	82.	1.48	45.7	288.
0.69	13.4	84.	1.49	46.2	291.
0.70	13.7	86.	1.50	46.7	294.
0.71	14.0	88.	1.51	47.2	297.
0.72	14.3	90.	1.52	47.6	300.
0.73	14.7	92.	1.53	48.1	303.
0.74	15.0	94.	1.54	48.6	306.
0.75	15.3	96.	1.55	49.1	309.
0.76	15.7	99.	1.56	49.6	312.
0.77	16.0	101.	1.57	50.1	315.
0.78	16.3	103.	1.58	50.6	318.
0.79	16.7	105.	1.59	51.1	321.

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DIESEL OIL TK. (S)

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
1.60	51.6	324.
1.61	52.1	327.
1.62	52.6	331.
1.63	53.1	334.
1.64	53.6	337.
1.65	54.1	340.
1.66	54.6	343.
1.67	55.1	347.
1.68	55.6	350.
1.69	56.1	353.
1.70	56.6	356.
1.71	57.2	359.
1.72	57.7	363.
1.73	58.2	366.
1.74	58.7	369.
1.75	59.2	373.
1.76	59.8	376.
1.77	60.3	379.
1.78	60.8	383.
1.79	61.4	386.
1.80	61.9	389.
1.81	62.4	393.
1.82	63.0	396.
1.83	63.5	399.
1.84	64.0	403.
1.85	64.6	406.
1.86	65.1	410.
1.87	65.7	413.
1.88	66.2	416.
1.89	66.8	420.
1.90	67.3	423.
1.91	67.9	427.
1.92	68.4	430.
1.93	69.0	434.
1.94	69.5	437.
1.95	70.1	441.
1.96	70.7	444.
1.97	71.2	448.
1.98	71.8	452.
1.99	72.4	455.
2.00	73.0	459.
2.01	73.5	462.
2.02	74.1	466.
2.03	74.7	470.
2.04	75.3	473.
2.05	75.9	477.
2.06	76.4	481.
2.07	77.0	484.
2.08	77.6	488.
2.09	78.2	492.
2.10	78.8	496.
2.11	79.4	500.
2.12	80.0	503.
2.13	80.6	507.
2.14	81.2	511.
2.15	81.9	515.
2.16	82.5	519.
2.17	83.1	522.
2.18	83.7	526.
2.19	84.3	530.
2.20	84.9	534.
2.21	85.5	538.
2.22	86.1	542.
2.23	86.8	546.
2.24	87.4	550.
2.25	88.0	553.
2.26	88.6	557.
2.27	89.2	561.
2.28	89.8	565.
2.29	90.5	569.
2.30	91.1	573.
2.31	91.7	577.
2.32	92.3	580.
2.33	92.9	584.
2.34	93.5	588.
2.35	94.1	592.
2.36	94.7	596.
2.37	95.3	600.
2.38	95.9	603.
2.39	96.5	607.
2.40	97.2	611.
2.41	97.8	615.
2.42	98.4	619.
2.43	99.0	622.
2.44	99.6	626.
2.45	100.2	630.
2.46	100.8	634.
2.47	101.0	635.
2.48	101.0	635.

D.O.SETT.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.1)	0 (1.)
0.02	0.3	2.
0.04	0.5	3.
0.06	0.6	4.
0.08	0.8	5.
0.10	1.0	6.
0.12	1.2	7.
0.14	1.3	8.
0.16	1.5	9.
0.18	1.7	11.
0.20	1.8	12.
0.22	2.0	13.
0.24	2.2	14.
0.26	2.4	15.
0.28	2.5	16.
0.30	2.7	17.
0.32	2.9	18.
0.34	3.0	19.
0.36	3.2	20.
0.38	3.4	21.
0.40	3.6	22.
0.42	3.7	23.
0.44	3.9	25.
0.46	4.1	26.
0.48	4.2	27.
0.50	4.4	28.
0.52	4.6	29.
0.54	4.8	30.
0.56	4.9	31.
0.58	5.1	32.
0.60	5.3	33.
0.62	5.4	34.
0.64	5.6	35.
0.66	5.8	36.
0.68	6.0	37.
0.70	6.1	39.
0.72	6.3	40.
0.74	6.5	41.
0.76	6.6	42.
0.78	6.8	43.
0.80	7.0	44.
0.82	7.2	45.
0.84	7.3	46.
0.86	7.5	47.
0.88	7.7	48.
0.90	7.8	49.
0.92	8.0	50.
0.94	8.2	51.
0.96	8.3	52.
0.98	8.5	54.
1.00	8.7	55.
1.02	8.9	56.
1.04	9.0	57.
1.06	9.2	58.
1.08	9.4	59.
1.10	9.5	60.
1.12	9.7	61.
1.14	9.9	62.
1.16	10.1	63.
1.18	10.2	64.
1.20	10.4	65.
1.22	10.6	66.
1.24	10.7	68.
1.26	10.9	69.
1.28	11.1	70.
1.30	11.3	71.
1.32	11.4	72.
1.34	11.6	73.
1.36	11.8	74.
1.38	11.9	75.
1.40	12.1	76.
1.42	12.3	77.
1.44	12.5	78.
1.46	12.6	79.
1.48	12.8	80.
1.50	13.0	82.
1.52	13.1	83.
1.54	13.3	84.
1.56	13.5	85.
1.58	13.6	86.
1.60	13.8	87.
1.62	14.0	88.
1.64	14.2	89.
1.66	14.3	90.
1.68	14.5	91.
1.70	14.7	92.
1.72	14.8	93.
1.74	15.0	94.
1.76	15.2	95.
1.78	15.4	97.
1.80	15.5	98.
1.82	15.7	99.
1.84	15.9	100.
1.86	16.0	101.
1.88	16.2	102.
1.90	16.4	103.
1.92	16.6	104.
1.94	16.7	105.
1.96	16.9	106.
1.98	17.1	107.
2.00	17.2	108.
2.02	17.4	110.
2.04	17.6	111.
2.06	17.8	112.
2.08	17.9	113.
2.10	18.1	114.
2.12	18.3	115.
2.14	18.4	116.
2.16	18.6	117.
2.18	18.8	118.
2.20	19.0	119.
2.22	19.1	120.
2.24	19.3	121.
2.26	19.5	122.
2.28	19.6	123.
2.30	19.8	125.
2.32	20.0	126.
2.34	20.2	127.
2.36	20.3	128.
2.38	20.5	129.
2.40	20.7	130.
2.42	20.8	131.
2.44	21.0	132.
2.46	21.2	133.
2.48	21.3	134.
2.50	21.5	135.
2.52	21.7	136.
2.54	21.9	137.
2.56	22.0	139.
2.58	22.2	140.
2.60	22.4	141.
2.62	22.5	142.
2.64	22.7	143.
2.66	22.9	144.
2.68 OVER FLOW	23.1	145.
2.70 PIPE	23.2	146.
2.72	23.4	147.

D.O.SERV.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.1)	0 (1)
0.02	0.3	2.
0.04	0.5	3.
0.06	0.7	4.
0.08	0.8	5.
0.10	1.0	6.
0.12	1.2	7.
0.14	1.3	8.
0.16	1.5	9.
0.18	1.7	11.
0.20	1.8	12.
0.22	2.0	13.
0.24	2.2	14.
0.26	2.4	15.
0.28	2.5	16.
0.30	2.7	17.
0.32	2.9	18.
0.34	3.1	19.
0.36	3.2	20.
0.38	3.4	21.
0.40	3.6	22.
0.42	3.7	24.
0.44	3.9	25.
0.46	4.1	26.
0.48	4.3	27.
0.50	4.4	28.
0.52	4.6	29.
0.54	4.8	30.
0.56	4.9	31.
0.58	5.1	32.
0.60	5.3	33.
0.62	5.5	34.
0.64	5.6	35.
0.66	5.8	36.
0.68	6.0	38.
0.70	6.1	39.
0.72	6.3	40.
0.74	6.5	41.
0.76	6.7	42.
0.78	6.8	43.
0.80	7.0	44.
0.82	7.2	45.
0.84	7.4	46.
0.86	7.5	47.
0.88	7.7	48.
0.90	7.9	50.
0.92	8.0	51.
0.94	8.2	52.
0.96	8.4	53.
0.98	8.6	54.
1.00	8.7	55.
1.02	8.9	56.
1.04	9.1	57.
1.06	9.3	58.
1.08	9.4	59.
1.10	9.6	60.
1.12	9.8	62.
1.14	10.0	63.
1.16	10.1	64.
1.18	10.3	65.
1.20	10.5	66.
1.22	10.7	67.
1.24	10.8	68.
1.26	11.0	69.
1.28	11.2	70.
1.30	11.3	71.
1.32	11.5	72.
1.34	11.7	74.
1.36	11.9	75.
1.38	12.0	76.
1.40	12.2	77.
1.42	12.4	78.
1.44	12.6	79.
1.46	12.7	80.
1.48	12.9	81.
1.50	13.1	82.
1.52	13.3	83.
1.54	13.4	85.
1.56	13.6	86.
1.58	13.8	87.
1.60	14.0	88.
1.62	14.1	89.
1.64	14.3	90.
1.66	14.5	91.
1.68	14.7	92.
1.70	14.8	93.
1.72	15.0	94.
1.74	15.2	95.
1.76	15.4	97.
1.78	15.5	98.
1.80	15.7	99.
1.82	15.9	100.
1.84	16.1	101.
1.86	16.2	102.
1.88	16.4	103.
1.90	16.6	104.
1.92	16.8	105.
1.94	16.9	106.
1.96	17.1	108.
1.98	17.3	109.
2.00	17.5	110.
2.02	17.6	111.
2.04	17.8	112.
2.06	18.0	113.
2.08	18.2	114.
2.10	18.3	115.
2.12	18.5	116.
2.14	18.7	117.
2.16	18.9	119.
2.18	19.0	120.
2.20	19.2	121.
2.22	19.4	122.
2.24	19.6	123.
2.26	19.7	124.
2.28	19.9	125.
2.30	20.1	126.
2.32	20.3	127.
2.34	20.4	129.
2.36	20.6	130.
2.38	20.8	131.
2.40	21.0	132.
2.42	21.2	133.
2.44	21.3	134.
2.46	21.5	135.
2.48	21.7	136.
2.50	21.8	137.
2.52	22.0	139.
2.54	22.2	140.
2.56	22.4	141.
2.58	22.6	142.
2.60 OVER FLOW	22.7	143.
2.62 PIPE	22.9	144.
2.64	23.1	145.

D.O.SLUDGE TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.1)	0.
0.01	0.1	1.
0.02	0.1	1.
0.03	0.2	1.
0.04	0.2	1.
0.05	0.2	1.
0.06	0.3	2.
0.07	0.3	2.
0.08	0.3	2.
0.09	0.4	2.
0.10	0.4	2.
0.11	0.4	3.
0.12	0.5	3.
0.13	0.5	3.
0.14	0.5	3.
0.15	0.6	3.
0.16	0.6	4.
0.17	0.6	4.
0.18	0.7	4.
0.19	0.7	4.
0.20	0.7	5.
0.21	0.8	5.
0.22	0.8	5.
0.23	0.8	5.
0.24	0.9	5.
0.25	0.9	6.
0.26	0.9	6.
0.27	1.0	6.
0.28	1.0	6.
0.29	1.0	6.
0.30	1.1	7.
0.31	1.1	7.
0.32	1.1	7.
0.33	1.2	7.
0.34	1.2	7.
0.35	1.2	8.
0.36	1.3	8.
0.37	1.3	8.
0.38	1.3	8.
0.39	1.4	9.
0.40	1.4	9.
0.41	1.4	9.
0.42	1.5	9.
0.43	1.5	9.
0.44 OVERFLOW	1.5	10.
0.45 PIPE	1.6	10.
0.46	1.6	10.
0.47	1.6	10.
0.48	1.7	10.
0.49	1.7	11.
0.50	1.7	11.

TS1323

M/E L.O.STOR.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.1)	0 (1.)	1.60	13.8	87.
0.02	0.3	2.	1.62	14.0	88.
0.04	0.5	3.	1.64	14.2	89.
0.06	0.6	4.	1.66	14.3	90.
0.08	0.8	5.	1.68	14.5	91.
0.10	1.0	6.	1.70	14.7	92.
0.12	1.2	7.	1.72	14.8	93.
0.14	1.3	8.	1.74	15.0	94.
0.16	1.5	9.	1.76	15.2	95.
0.18	1.7	11.	1.78	15.4	97.
0.20	1.8	12.	1.80	15.5	98.
0.22	2.0	13.	1.82	15.7	99.
0.24	2.2	14.	1.84	15.9	100.
0.26	2.4	15.	1.86	16.0	101.
0.28	2.5	16.	1.88	16.2	102.
0.30	2.7	17.	1.90	16.4	103.
0.32	2.9	18.	1.92	16.6	104.
0.34	3.0	19.	1.94	16.7	105.
0.36	3.2	20.	1.96	16.9	106.
0.38	3.4	21.	1.98	17.1	107.
0.40	3.6	22.	2.00	17.2	108.
0.42	3.7	23.	2.02	17.4	109.
0.44	3.9	25.	2.04	17.6	111.
0.46	4.1	26.	2.06	17.8	112.
0.48	4.2	27.	2.08	17.9	113.
0.50	4.4	28.	2.10	18.1	114.
0.52	4.6	29.	2.12	18.3	115.
0.54	4.8	30.	2.14	18.4	116.
0.56	4.9	31.	2.16	18.6	117.
0.58	5.1	32.	2.18	18.8	118.
0.60	5.3	33.	2.20	19.0	119.
0.62	5.4	34.	2.22	19.1	120.
0.64	5.6	35.	2.24	19.3	121.
0.66	5.8	36.	2.26	19.5	122.
0.68	6.0	37.	2.28	19.6	124.
0.70	6.1	38.	2.30	19.8	125.
0.72	6.3	40.	2.32	20.0	126.
0.74	6.5	41.	2.34	20.2	127.
0.76	6.6	42.	2.36	20.3	128.
0.78	6.8	43.	2.38	20.5	129.
0.80	7.0	44.	2.40	20.7	130.
0.82	7.1	45.	2.42	20.8	131.
0.84	7.3	46.	2.44	21.0	132.
0.86	7.5	47.	2.46	21.2	133.
0.88	7.7	48.	2.48	21.4	134.
0.90	7.8	49.	2.50	21.5	135.
0.92	8.0	50.	2.52	21.7	136.
0.94	8.2	51.	2.54	21.9	137.
0.96	8.3	52.	2.56	22.0	139.
0.98	8.5	54.	2.58	22.2	140.
1.00	8.7	55.	2.60	22.4	141.
1.02	8.9	56.	2.62	22.5	142.
1.04	9.0	57.	2.64	22.7	143.
1.06	9.2	58.	2.66	22.9	144.
1.08	9.4	59.	2.68	23.1	145.
1.10	9.5	60.	2.70	23.2	146.
1.12	9.7	61.	2.72	23.4	147.
1.14	9.9	62.	2.74	23.6	148.
1.16	10.1	63.	2.76	23.7	149.
1.18	10.2	64.	2.78	23.9	150.
1.20	10.4	65.	2.80	24.1	151.
1.22	10.6	66.	2.82	24.3	153.
1.24	10.7	68.	2.84	24.4	154.
1.26	10.9	69.	2.86	24.6	155.
1.28	11.1	70.	2.88	24.8	156.
1.30	11.3	71.	2.90	24.9	157.
1.32	11.4	72.	2.92	25.1	158.
1.34	11.6	73.	2.94	25.3	159.
1.36	11.8	74.	2.96	25.5	160.
1.38	11.9	75.	2.98	25.6	161.
1.40	12.1	76.	3.00	25.8	162.
1.42	12.3	77.	3.02	26.0	163.
1.44	12.4	78.	3.04	26.1	164.
1.46	12.6	79.	3.06	26.3	165.
1.48	12.8	80.	3.08	26.5	167.
1.50	13.0	82.	3.10	26.7	168.
1.52	13.1	83.	3.12	26.8	169.
1.54	13.3	84.	3.14	27.0	170.
1.56	13.5	85.	3.16	27.2	171.
1.58	13.6	86.	3.18	27.3	172.

TS1323

M/E L.O.STOR.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
3.20	27.5	173.	4.80	41.2	259.
3.22	27.7	174.	4.82	41.4	260.
3.24	27.8	175.	4.84	41.5	261.
3.26	28.0	176.	4.86	41.7	262.
3.28	28.2	177.	4.88	41.9	263.
3.30	28.4	178.	4.90	42.0	264.
3.32	28.5	179.	4.92	42.2	266.
3.34	28.7	181.	4.94	42.4	267.
3.36	28.9	182.	4.96	42.6	268.
3.38	29.0	183.	4.98	42.7	269.
3.40	29.2	184.	5.00	42.9	270.
3.42	29.4	185.	5.02	43.1	271.
3.44	29.6	186.	5.04	43.2	272.
3.46	29.7	187.	5.06	43.4	273.
3.48	29.9	188.	5.08	43.6	274.
3.50	30.1	189.	5.10	43.8	275.
3.52	30.2	190.	5.12	43.9	276.
3.54	30.4	191.	5.14	44.1	277.
3.56	30.6	192.	5.16	44.3	278.
3.58	30.8	193.	5.18	44.4	280.
3.60	30.9	194.	5.20	44.6	281.
3.62	31.1	196.	5.22	44.8	282.
3.64	31.3	197.	5.24	45.0	283.
3.66	31.4	198.	5.26	45.1	284.
3.68	31.6	199.	5.28	45.3	285.
3.70	31.8	200.	5.30	45.5	286.
3.72	32.0	201.	5.32	45.6	287.
3.74	32.1	202.	5.34	45.8	288.
3.76	32.3	203.	5.36	46.0	289.
3.78	32.5	204.	5.38	46.2	290.
3.80	32.6	205.	5.40	46.3	291.
3.82	32.8	206.	5.42	46.5	292.
3.84	33.0	207.	5.44	46.7	293.
3.86	33.1	208.	5.46	46.8	295.
3.88	33.3	210.	5.48	47.0	296.
3.90	33.5	211.	5.50	47.2	297.
3.92	33.7	212.	5.52	47.4	298.
3.94	33.8	213.	5.54	47.5	299.
3.96	34.0	214.	5.56	47.7	300.
3.98	34.2	215.	5.58	47.9	301.
4.00	34.3	216.	5.60	48.0	302.
4.02	34.5	217.	5.62	48.2	303.
4.04	34.7	218.	5.64	48.4	304.
4.06	34.9	219.	5.66	48.5	305.
4.08	35.0	220.	5.68	48.7	306.
4.10	35.2	221.	5.70	48.9	307.
4.12	35.4	222.	5.72	49.1	309.
4.14	35.5	224.	5.74	49.2	310.
4.16	3[illegible]	225.	5.76	49.4	311.
4.18	35.9	226.	5.78	49.6	312.
4.20	36.1	227.	5.80	49.7	313.
4.22	36.2	228.	5.82	49.9	314.
4.24	36.4	229.	5.84	50.1	315.
4.26	36.6	230.	5.86	50.3	316.
4.28	36.7	231.	5.88	50.4	317.
4.30	36.9	232.	5.90	50.6	318.
4.32	37.1	233.	5.92	50.8	319.
4.34	37.3	234.	5.94	50.9	320.
4.36	37.4	235.	5.96	51.1	321.
4.38	37.6	236.	5.98	51.3	323.
4.40	37.8	238.	6.00	51.5	324.
4.42	37.9	239.	6.02	51.6	325.
4.44	38.1	240.	6.04	51.8	326.
4.46	38.3	241.	6.06	52.0	327.
4.48	38.4	242.	6.08	52.1	328.
4.50	38.6	243.	6.10	52.3	329.
4.52	38.8	244.	6.12	52.5	330.
4.54	39.0	245.	6.14	52.7	331.
4.56	39.1	246.	6.16	52.8	332.
4.58	39.3	247.	6.18	53.0	333.
4.60	39.5	248.	6.20	53.2	334.
4.62	39.6	249.	6.22	53.3	335.
4.64	39.8	250.	6.24	53.5	337.
4.66	40.0	251.	6.26	53.7	338.
4.68	40.2	253.	6.28	53.8	339.
4.70	40.3	254.	6.30	54.0	340.
4.72	40.5	255.	6.32	54.2	341.
4.74	40.7	256.	6.34	54.4	342.
4.76	40.8	257.	6.36	54.5	343.
4.78	41.0	258.	6.38	54.7	344.

M/E L.O.STOR.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
6.40	54.9	345.
6.42	55.0	346.
6.44	55.2	347.
6.46	55.4	348.
6.48	55.6	349.
6.50	55.7	350.
6.52	55.9	352.
6.54	56.1	353.
6.56	56.2	354.
6.58	56.4	355.
6.60	56.6	356.
6.62	56.8	357.
6.64	56.9	358.
6.66	57.1	359.
6.68	57.3	360.
6.70	57.4	361.
6.72	57.6	362.
6.74	57.8	363.
6.76	58.0	364.
6.78	58.1	366.
6.80	58.3	367.
6.82	58.5	368.
6.84	58.6	369.
6.86	58.8	370.
6.88	59.0	371.
6.90	59.2	372.
6.92	59.3	373.
6.94	59.5	374.
6.96	59.7	375.
6.98	59.8	376.
7.00	60.0	377.
7.02	60.2	378.
7.04	60.3	380.
7.06	60.5	381.
7.08	60.7	381.
7.10	60.7	382.
7.12	60.8	382.
7.14	60.8	382.

BTM.RESERV.L.O.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (1.0)	0 (6.)	0.80	45.9	289.
0.01	1.6	10.	0.81	46.1	290.
0.02	2.2	14.	0.82	46.2	290.
0.03	2.8	18.	0.83	46.3	291.
0.04	3.4	21.	0.84	46.4	292.
0.05	4.0	25.	0.85	46.5	293.
0.06	4.6	29.	0.86	46.6	293.
0.07	5.2	33.	0.87	46.8	294.
0.08	5.8	37.	0.88	46.9	295.
0.09	6.4	40.	0.89	47.0	296.
0.10	7.0	44.	0.90	47.1	296.
0.11	7.6	48.	0.91	47.2	297.
0.12	8.2	52.	0.92	47.3	298.
0.13	8.9	56.	0.93	47.5	298.
0.14	9.5	60.	0.94	47.6	299.
0.15	10.1	63.	0.95	47.7	300.
0.16	10.7	67.	0.96	47.8	301.
0.17	11.3	71.	0.97	47.9	301.
0.18	11.9	75.	0.98	48.0	302.
0.19	12.5	79.	0.99	48.2	303.
0.20	13.1	82.	1.00	48.3	304.
0.21	13.7	86.	1.01	48.4	304.
0.22	14.3	90.	1.02	48.5	305.
0.23	14.9	94.	1.03	48.6	306.
0.24	15.5	98.	1.04	48.7	307.
0.25	16.1	102.	1.05	48.9	307.
0.26	16.8	105.	1.06	49.0	308.
0.27	17.4	109.	1.07	49.1	309.
0.28	18.0	113.	1.08	49.2	310.
0.29	18.6	117.	1.09	49.3	310.
0.30	19.2	121.	1.10	49.4	311.
0.31	19.8	124.	1.11	49.6	312.
0.32	20.4	128.	1.12	49.7	312.
0.33	21.0	132.	1.13	49.8	313.
0.34	21.6	136.	1.14	49.9	314.
0.35	22.2	140.	1.15	50.0	315.
0.36	22.8	144.	1.16	50.1	315.
0.37	23.4	147.	1.17	50.3	316.
0.38	24.0	151.	1.18	50.4	317.
0.39	24.7	155.	1.19	50.5	318.
0.40	25.3	159.	1.20	50.6	318.
0.41	25.9	163.	1.21	50.7	319.
0.42	26.5	166.	1.22	50.8	320.
0.43	27.1	170.	1.23	51.0	321.
0.44	27.7	174.	1.24	51.1	321.
0.45	28.3	178.	1.25	51.2	322.
0.46	28.9	182.	1.26	51.3	323.
0.47	29.5	186.	1.27	51.4	323.
0.48	30.1	189.	1.28	51.5	324.
0.49	30.7	193.	1.29	51.7	325.
0.50	31.3	197.	1.30	51.8	326.
0.51	31.9	201.	1.31	51.9	326.
0.52	32.6	205.	1.32	52.0	327.
0.53	33.2	209.	1.33	52.1	328.
0.54	33.8	212.	1.34	52.2	329.
0.55	34.4	216.	1.35	52.4	329.
0.56	35.0	220.	1.36	52.5	330.
0.57	35.6	224.	1.37	52.6	331.
0.58	36.1	227.	1.38	52.7	332.
0.59	36.7	231.	1.39	52.8	332.
0.60	37.2	234.	1.40	52.9	333.
0.61	37.8	238.	1.41	53.1	334.
0.62	38.3	241.	1.42	53.2	334.
0.63	38.9	245.	1.43	53.3	335.
0.64	39.4	248.	1.44	53.4	336.
0.65	40.0	251.	1.45	53.5	337.
0.66	40.5	255.	1.46	53.7	337.
0.67	41.1	258.	1.47	53.8	338.
0.68	41.6	262.	1.48	53.9	339.
0.69	42.2	265.	1.49	54.0	340.
0.70	42.7	269.	1.50	54.1	340.
0.71	43.2	272.	1.51	54.2	341.
0.72	43.8	275.	1.52	54.3	342.
0.73	44.3	279.	1.53	54.5	343.
0.74	44.9	282.	1.54	54.6	343.
0.75	45.4	285.	1.55	54.7	344.
0.76	45.5	286.	1.56	54.8	345.
0.77	45.6	287.	1.57	54.9	345.
0.78	45.7	287.	1.58	55.1	346.
0.79	45.8	288.	1.59	55.2	347.

BTM.RESERV.L.O.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
1.60	55.3	348.
1.61	55.4	348.
1.62	55.5	349.
1.63	55.6	350.
1.64	55.8	351.
1.65	55.9	351.
1.66	56.0	352.
1.67	56.1	353.
1.68	56.2	354.
1.69	56.3	354.
1.70	56.5	355.
1.71	56.6	356.
1.72	56.6	356.
1.73	56.6	356.
1.74	56.6	356.

BTM.L.O.SUMP.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.3)	0 (2.)
0.01	0.3	2.
0.02	0.4	2.
0.03	0.4	3.
0.04	0.5	3.
0.05	0.6	4.
0.06	0.7	4.
0.07	0.7	5.
0.08	0.8	5.
0.09	0.9	6.
0.10	1.0	6.
0.11	1.0	7.
0.12	1.1	7.
0.13	1.2	8.
0.14	1.5	9.
0.15	2.0	12.
0.16	2.5	15.
0.17	3.0	19.
0.18	3.4	22.
0.19	3.9	25.
0.20	4.4	28.
0.21	4.9	31.
0.22	5.4	34.
0.23	5.9	37.
0.24	6.4	40.
0.25	6.9	43.
0.26	7.4	46.
0.27	7.9	49.
0.28	8.4	53.
0.29	8.8	56.
0.30	9.3	59.
0.31	9.8	62.
0.32	10.3	65.
0.33	10.8	68.
0.34	11.3	71.
0.35	11.8	74.
0.36	12.3	77.
0.37	12.8	80.
0.38	13.3	83.
0.39	13.8	86.
0.40	14.2	90.
0.41	14.7	93.
0.42	15.2	96.
0.43	15.7	99.
0.44	16.2	102.
0.45	16.7	105.
0.46	17.2	108.
0.47	17.7	111.
0.48	18.2	114.
0.49	18.7	117.
0.50	19.1	120.
0.51	19.6	123.
0.52	20.1	127.
0.53	20.6	130.
0.54	21.1	133.
0.55	21.6	136.
0.56	22.1	139.
0.57	22.6	142.
0.58	23.1	145.
0.59	23.6	148.
0.60	24.1	151.
0.61	24.5	154.
0.62	25.0	157.
0.63	25.5	161.
0.64	26.0	164.
0.65	26.5	167.
0.66	27.0	170.
0.67	27.5	173.
0.68	28.0	176.
0.69	28.5	179.
0.70	29.0	182.
0.71	29.4	185.
0.72	29.9	188.
0.73	30.4	191.
0.74	30.9	194.
0.75	31.4	198.
0.76	31.9	201.
0.77	32.4	204.
0.78	32.9	207.
0.79	33.4	210.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.80	33.9	213.
0.81	34.4	216.
0.82	34.8	219.
0.83	35.3	222.
0.84	35.8	225.
0.85	36.3	228.
0.86	36.8	231.
0.87	37.3	235.
0.88	37.8	238.
0.89	38.3	241.
0.90	38.8	244.
0.91	39.3	247.
0.92	39.8	250.
0.93	40.2	253.
0.94	40.7	256.
0.95	41.2	259.
0.96	41.7	262.
0.97	42.2	265.
0.98	42.7	269.
0.99	43.2	272.
1.00	43.7	275.
1.01	44.2	278.
1.02	44.7	281.
1.03	45.2	284.
1.04	45.6	287.
1.05	46.1	290.
1.06	46.6	293.
1.07	47.1	296.
1.08	47.6	299.
1.09	47.9	301.
1.10	47.9	301.
1.11	47.9	301.

L.O.SLUDGE TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.1)	0 (1.)
0.01	0.2	1.
0.02	0.3	2.
0.03	0.3	2.
0.04	0.4	2.
0.05	0.5	3.
0.06	0.5	3.
0.07	0.6	4.
0.08	0.7	4.
0.09	0.8	5.
0.10	0.8	5.
0.11	0.9	6.
0.12	1.0	6.
0.13	1.0	6.
0.14	1.1	7.
0.15	1.2	7.
0.16	1.2	8.
0.17	1.3	8.
0.18	1.4	9.
0.19	1.5	9.
0.20	1.5	10.
0.21	1.6	10.
0.22	1.7	11.
0.23	1.7	11.
0.24	1.8	11.
0.25	1.9	12.
0.26	2.0	12.
0.27	2.0	13.
0.28	2.1	13.
0.29	2.2	14.
0.30	2.2	14.
0.31	2.3	15.
0.32	2.4	15.
0.33	2.5	15.
0.34	2.5	16.
0.35	2.6	16.
0.36	2.7	17.
0.37	2.7	17.
0.38	2.8	18.
0.39	2.9	18.
0.40	3.0	19.
0.41	3.0	19.
0.42	3.1	19.
0.43	3.2	20.
0.44 OVERFLOW PIPE	3.2	20.
0.45	3.3	21.
0.46	3.4	21.
0.47	3.5	22.
0.48	3.5	22.
0.49	3.6	23.
0.50	3.7	23.

S/T L.O.DRAIN TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.1)	0 (1.)
0.01	0.2	1.
0.02	0.3	2.
0.03	0.3	2.
0.04	0.4	3.
0.05	0.5	3.
0.06	0.6	4.
0.07	0.6	4.
0.08	0.7	4.
0.09	0.8	5.
0.10	0.8	5.
0.11	0.9	6.
0.12	1.0	6.
0.13	1.1	7.
0.14	1.1	7.
0.15	1.2	8.
0.16	1.3	8.
0.17	1.4	9.
0.18	1.4	9.
0.19	1.5	10.
0.20	1.6	10.
0.21	1.7	10.
0.22	1.7	11.
0.23	1.8	11.
0.24	1.9	12.
0.25	2.0	12.
0.26	2.0	13.
0.27	2.1	13.
0.28	2.2	14.
0.29	2.2	14.
0.30	2.3	15.
0.31	2.4	15.
0.32	2.5	16.
0.33	2.5	16.
0.34	2.6	16.
0.35	2.7	17.
0.36	2.8	17.
0.37	2.8	18.
0.38	2.9	18.
0.39	3.0	19.
0.40	3.1	19.
0.41	3.1	20.
0.42	3.2	20.
0.43	3.3	21.
0.44	3.3	21.
0.45	3.4	22.
0.46	3.5	22.
0.47	3.6	22.
0.48	3.6	23.
0.49	3.7	23.
0.50	3.8	24.
0.51	3.9	24.
0.52	3.9	25.
0.53	4.0	25.
0.54	4.1	26.
0.55	4.2	26.
0.56	4.2	27.
0.57	4.3	27.
0.58	4.4	28.
0.59	4.5	28.
0.60	4.5	28.
0.61	4.6	29.
0.62	4.7	29.
0.63	4.7	30.
0.64	4.8	30.
0.65	4.9	31.
0.66	5.0	31.
0.67	5.0	32.
0.68	5.1	32.
0.69	5.2	33.
0.70	5.3	33.
0.71	5.3	34.
0.72	5.4	34.
0.73	5.5	34.
0.74	5.6	35.
0.75	5.6	35.
0.76	5.7	36.
0.77	5.8	36.
0.78	5.8	37.
0.79	5.9	37.

CYL.O.STOR.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.3)	0 (2.)	1.60	27.7	174.
0.02	0.7	4.	1.62	28.0	176.
0.04	1.0	6.	1.64	28.4	178.
0.06	1.4	8.	1.66	28.7	181.
0.08	1.7	11.	1.68	29.1	183.
0.10	2.0	13.	1.70	29.4	185.
0.12	2.4	15.	1.72	29.7	187.
0.14	2.7	17.	1.74	30.1	189.
0.16	3.1	19.	1.76	30.4	191.
0.18	3.4	21.	1.78	30.8	194.
0.20	3.7	24.	1.80	31.1	196.
0.22	4.1	26.	1.82	31.5	198.
0.24	4.4	28.	1.84	31.8	200.
0.26	4.8	30.	1.86	32.1	202.
0.28	5.1	32.	1.88	32.5	204.
0.30	5.5	34.	1.90	32.8	206.
0.32	5.8	36.	1.92	33.2	209.
0.34	6.1	39.	1.94	33.5	211.
0.36	6.5	41.	1.96	33.9	213.
0.38	6.8	43.	1.98	34.2	215.
0.40	7.2	45.	2.00	34.5	217.
0.42	7.5	47.	2.02	34.9	219.
0.44	7.8	49.	2.04	35.2	221.
0.46	8.2	52.	2.06	35.6	224.
0.48	8.5	54.	2.08	35.9	226.
0.50	8.9	56.	2.10	36.2	228.
0.52	9.2	58.	2.12	36.6	230.
0.54	9.6	60.	2.14	36.9	232.
0.56	9.9	62.	2.16	37.3	234.
0.58	10.2	64.	2.18	37.6	237.
0.60	10.6	67.	2.20	38.0	239.
0.62	10.9	69.	2.22	38.3	241.
0.64	11.3	71.	2.24	38.6	243.
0.66	11.6	73.	2.26	39.0	245.
0.68	12.0	75.	2.28	39.3	247.
0.70	12.3	77.	2.30	39.7	249.
0.72	12.6	79.	2.32	40.0	252.
0.74	13.0	82.	2.34	40.3	254.
0.76	13.3	84.	2.36	40.7	256.
0.78	13.7	86.	2.38	41.0	258.
0.80	14.0	88.	2.40	41.4	260.
0.82	14.3	90.	2.42	41.7	262.
0.84	14.7	92.	2.44	42.1	265.
0.86	15.0	95.	2.46	42.4	267.
0.88	15.4	97.	2.48	42.7	269.
0.90	15.7	99.	2.50	43.1	271.
0.92	16.1	101.	2.52	43.4	273.
0.94	16.4	103.	2.54	43.8	275.
0.96	16.7	105.	2.56	44.1	277.
0.98	17.1	107.	2.58	44.5	280.
1.00	17.4	110.	2.60	44.8	282.
1.02	17.8	112.	2.62	45.1	284.
1.04	18.1	114.	2.64	45.5	286.
1.06	18.5	116.	2.66	45.8	288.
1.08	18.8	118.	2.68	46.2	290.
1.10	19.1	120.	2.70	46.5	292.
1.12	19.5	122.	2.72	46.8	295.
1.14	19.8	125.	2.74	47.2	297.
1.16	20.2	127.	2.76	47.5	299.
1.18	20.5	129.	2.78	47.9	301.
1.20	20.8	131.	2.80	48.2	303.
1.22	21.2	133.	2.82	48.6	305.
1.24	21.5	135.	2.84	48.9	308.
1.26	21.9	138.	2.86	49.2	310.
1.28	22.2	140.	2.88	49.6	312.
1.30	22.6	142.	2.90	49.9	314.
1.32	22.9	144.	2.92	50.3	316.
1.34	23.2	146.	2.94	50.6	318.
1.36	23.6	148.	2.96	50.9	320.
1.38	23.9	151.	2.98	51.3	323.
1.40	24.3	153.	3.00	51.6	325.
1.42	24.6	155.	3.02	52.0	327.
1.44	25.0	157.	3.04	52.3	329.
1.46	25.3	159.	3.06	52.7	331.
1.48	25.6	161.	3.08	53.0	333.
1.50	26.0	163.	3.10	53.4	336.
1.52	26.3	166.	3.12	53.7	338.
1.54	26.7	168.	3.14	54.0	340.
1.56	27.0	170.	3.16	54.4	342.
1.58	27.4	172.	3.18	54.7	344.

CYL.O.STOR.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
3.20	55.1	346.
3.22	55.4	348.
3.24	55.7	351.
3.26	56.1	353.
3.28	56.4	355.
3.30	56.8	357.
3.32	57.1	359.
3.34	57.5	361.
3.36	57.8	364.
3.38	58.1	366.
3.40	58.5	368.
3.42	58.8	370.
3.44	59.2	372.
3.46	59.5	374.
3.48	59.8	376.
3.50	59.9	377.
3.52	59.9	377.

SOOT CLEAN W.TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.2)	0 (1.)	1.60	20.6	130.
0.02	0.4	2.	1.62	20.9	132.
0.04	0.6	4.	1.64	21.2	134.
0.06	0.8	5.	1.66	21.5	135.
0.08	1.0	6.	1.68	21.8	137.
0.10	1.2	8.	1.70	22.1	139.
0.12	1.4	9.	1.72	22.4	141.
0.14	1.7	10.	1.74	22.7	143.
0.16	1.9	12.	1.76	23.0	145.
0.18	2.1	13.	1.78	23.3	147.
0.20	2.3	15.	1.80	23.6	149.
0.22	2.5	16.	1.82	23.9	150.
0.24	2.7	17.	1.84	24.2	152.
0.26	3.0	19.	1.86	24.5	154.
0.28	3.2	20.	1.88	24.8	156.
0.30	3.4	22.	1.90	25.1	158.
0.32	3.7	23.	1.92	25.4	160.
0.34	3.9	24.	1.94	25.7	162.
0.36	4.1	26.	1.96	26.1	164.
0.38	4.3	27.	1.98	26.4	166.
0.40	4.6	29.	2.00	26.7	168.
0.42	4.8	30.	2.02	27.0	170.
0.44	5.0	32.	2.04	27.3	172.
0.46	5.3	33.	2.06	27.6	174.
0.48	5.5	35.	2.08	27.9	176.
0.50	5.8	36.	2.10	28.2	178.
0.52	6.0	38.	2.12	28.5	179.
0.54	6.3	39.	2.14	28.8	181.
0.56	6.5	41.	2.16	29.2	183.
0.58	6.7	42.	2.18	29.5	185.
0.60	7.0	44.	2.20	29.8	187.
0.62	7.2	45.	2.22	30.1	189.
0.64	7.5	47.	2.24	30.4	191.
0.66	7.7	49.	2.26	30.7	193.
0.68	8.0	50.	2.28	31.0	195.
0.70	8.2	52.	2.30	31.4	197.
0.72	8.5	53.	2.32	31.7	199.
0.74	8.7	55.	2.34	32.0	201.
0.76	9.0	57.	2.36	32.3	203.
0.78	9.3	58.	2.38	32.6	205.
0.80	9.5	60.	2.40	32.9	207.
0.82	9.8	61.	2.42	33.3	209.
0.84	10.0	63.	2.44	33.6	211.
0.86	10.3	65.	2.46	33.9	213.
0.88	10.6	66.	2.48	34.2	215.
0.90	10.8	68.	2.50	34.5	217.
0.92	11.1	70.	2.52	34.9	219.
0.94	11.4	71.	2.54	35.2	221.
0.96	11.6	73.	2.56	35.5	223.
0.98	11.9	75.	2.58	35.8	225.
1.00	12.2	76.	2.60	36.1	227.
1.02	12.4	78.	2.62	36.5	229.
1.04	12.7	80.	2.64	36.8	231.
1.06	13.0	82.	2.66	37.1	233.
1.08	13.2	83.	2.68	37.4	235.
1.10	13.5	85.	2.70	37.8	237.
1.12	13.8	87.	2.72	38.1	240.
1.14	14.1	88.	2.74	38.4	242.
1.16	14.3	90.	2.76	38.7	244.
1.18	14.6	92.	2.78	39.1	246.
1.20	14.9	94.	2.80	39.4	248.
1.22	15.2	95.	2.82	39.7	250.
1.24	15.5	97.	2.84	40.0	252.
1.26	15.7	99.	2.86	40.4	254.
1.28	16.0	101.	2.88	40.7	256.
1.30	16.3	103.	2.90	40.9	257.
1.32	16.6	104.	2.92	40.9	257.
1.34	16.9	106.			
1.36	17.2	108.			
1.38	17.4	110.			
1.40	17.7	111.			
1.42	18.0	113.			
1.44	18.3	115.			
1.46	18.6	117.			
1.48	18.9	119.			
1.50	19.2	121.			
1.52	19.5	122.			
1.54	19.8	124.			
1.56	20.1	126.			
1.58	20.3	128.			

CLEAN DRAIN TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)	SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.2)	0 (1.)	0.80	4.1	26.
0.01	0.2	1.	0.81	4.2	27.
0.02	0.2	1.	0.82	4.3	27.
0.03	0.2	1.	0.83	4.4	28.
0.04	0.2	1.	0.84	4.5	28.
0.05	0.2	2.	0.85	4.5	29.
0.06	0.3	2.	0.86	4.6	29.
0.07	0.3	2.	0.87	4.7	30.
0.08	0.3	2.	0.88	4.8	30.
0.09	0.3	2.	0.89	4.9	31.
0.10	0.4	2.	0.90	4.9	31.
0.11	0.4	2.	0.91	5.0	32.
0.12	0.4	3.	0.92	5.1	32.
0.13	0.4	3.	0.93	5.2	33.
0.14	0.5	3.	0.94	5.3	33.
0.15	0.5	3.	0.95	5.4	34.
0.16	0.5	3.	0.96	5.4	34.
0.17	0.6	4.	0.97	5.5	35.
0.18	0.6	4.	0.98	5.6	35.
0.19	0.6	4.	0.99	5.7	36.
0.20	0.7	4.	1.00	5.8	36.
0.21	0.7	4.	1.01	5.9	37.
0.22	0.7	5.	1.02	6.0	38.
0.23	0.8	5.	1.03	6.1	38.
0.24	0.8	5.	1.04	6.1	39.
0.25	0.9	5.	1.05	6.2	39.
0.26	0.9	6.	1.06	6.3	40.
0.27	0.9	6.	1.07	6.4	40.
0.28	1.0	6.	1.08	6.5	41.
0.29	1.0	6.	1.09	6.6	42.
0.30	1.1	7.	1.10	6.7	42.
0.31	1.1	7.	1.11	6.8	43.
0.32	1.2	7.	1.12	6.9	43.
0.33	1.2	8.	1.13	7.0	44.
0.34	1.3	8.	1.14	7.1	44.
0.35	1.3	8.	1.15	7.2	45.
0.36	1.3	8.	1.16	7.3	46.
0.37	1.4	9.	1.17	7.4	46.
0.38	1.4	9.	1.18	7.5	47.
0.39	1.5	9.	1.19	7.5	47.
0.40	1.5	10.	1.20	7.6	48.
0.41	1.6	10.	1.21	7.7	49.
0.42	1.7	10.	1.22	7.8	49.
0.43	1.7	11.	1.23	7.9	50.
0.44	1.8	11.	1.24	8.0	51.
0.45	1.8	11.	1.25	8.1	51.
0.46	1.9	12.	1.26	8.2	52.
0.47	1.9	12.	1.27	8.3	52.
0.48	2.0	12.	1.28	8.4	53.
0.49	2.0	13.	1.29	8.5	54.
0.50	2.1	13.	1.30	8.6	54.
0.51	2.2	14.	1.31	8.8	55.
0.52	2.2	14.	1.32	8.9	56.
0.53	2.3	14.	1.33	9.0	56.
0.54	2.3	15.	1.34	9.1	57.
0.55	2.4	15.	1.35	9.2	58.
0.56	2.5	16.	1.36	9.3	58.
0.57	2.5	16.	1.37	9.4	59.
0.58	2.6	16.	1.38	9.5	60.
0.59	2.7	17.	1.39	9.6	60.
0.60	2.7	17.	1.40	9.7	61.
0.61	2.8	18.	1.41	9.8	62.
0.62	2.9	18.	1.42	9.9	62.
0.63	2.9	18.	1.43	10.0	63.
0.64	3.0	19.	1.44	10.2	64.
0.65	3.1	19.	1.45	10.3	65.
0.66	3.1	20.	1.46	10.4	65.
0.67	3.2	20.	1.47	10.5	66.
0.68	3.3	21.	1.48	10.6	67.
0.69	3.3	21.	1.49	10.7	67.
0.70	3.4	21.	1.50	10.8	68.
0.71	3.5	22.	1.51	10.9	69.
0.72	3.6	22.	1.52	11.1	70.
0.73	3.6	23.	1.53	11.2	70.
0.74	3.7	23.	1.54	11.3	71.
0.75	3.8	24.	1.55	11.4	72.
0.76	3.8	24.	1.56	11.5	72.
0.77	3.9	25.	1.57	11.6	73.
0.78	4.0	25.	1.58	11.8	74.
0.79	4.1	26.	1.59	11.9	75.

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CLEAN DRAIN TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
1.60	12.0	75.
1.61	12.1	76.
1.62	12.2	77.
1.63	12.4	78.
1.64	12.5	79.
1.65	12.6	79.
1.66	12.7	80.
1.67	12.9	81.
1.68	13.0	82.
1.69	13.1	83.
1.70	13.2	83.
1.71	13.4	84.
1.72	13.5	85.
1.73	13.6	86.
1.74	13.8	87.
1.75	13.9	87.
1.76	14.0	88.
1.77	14.1	89.
1.78	14.3	90.
1.79	14.4	91.
1.80	14.5	91.
1.81	14.7	92.
1.82	14.8	93.
1.83	14.9	94.
1.84	15.1	95.
1.85	15.2	96.
1.86	15.3	96.
1.87	15.5	97.
1.88	15.6	98.
1.89	15.7	99.
1.90	15.9	100.
1.91	16.0	101.
1.92	16.1	101.
1.93	16.3	102.
1.94	16.4	103.
1.95	16.5	104.
1.96	16.7	105.
1.97	16.8	106.
1.98	16.9	106.
1.99	17.1	107.
2.00	17.2	108.
2.01	17.3	109.
2.02	17.5	110.
2.03	17.6	111.
2.04	17.7	111.
2.05	17.8	112.
2.06	17.8	112.
2.07	17.8	112.
2.08	17.8	112.

WASTE OIL TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (0.4)	0 (2.)
0.01	0.4	3.
0.02	0.4	3.
0.03	0.5	3.
0.04	0.5	3.
0.05	0.5	3.
0.06	0.6	4.
0.07	0.6	4.
0.08	0.7	4.
0.09	0.7	5.
0.10	0.8	5.
0.11	0.8	5.
0.12	0.9	6.
0.13	1.0	6.
0.14	1.0	6.
0.15	1.1	7.
0.16	1.1	7.
0.17	1.2	8.
0.18	1.3	8.
0.19	1.4	9.
0.20	1.4	9.
0.21	1.5	9.
0.22	1.6	10.
0.23	1.7	10.
0.24	1.7	11.
0.25	1.8	12.
0.26	1.9	12.
0.27	2.0	13.
0.28	2.1	13.
0.29	2.2	14.
0.30	2.3	14.
0.31	2.4	15.
0.32	2.5	16.
0.33	2.6	16.
0.34	2.7	17.
0.35	2.8	18.
0.36	2.9	18.
0.37	3.0	19.
0.38	3.2	20.
0.39	3.3	21.
0.40	3.4	21.
0.41	3.5	22.
0.42	3.7	23.
0.43	3.8	24.
0.44	3.9	25.
0.45	4.0	25.
0.46	4.2	26.
0.47	4.3	27.
0.48	4.4	28.
0.49	4.6	29.
0.50	4.7	30.
0.51	4.9	31.
0.52	5.0	32.
0.53	5.2	33.
0.54	5.3	33.
0.55	5.5	34.
0.56	5.6	35.
0.57	5.8	36.
0.58	5.9	37.
0.59	6.1	38.
0.60	6.3	39.
0.61	6.4	41.
0.62	6.6	42.
0.63	6.8	43.
0.64	7.0	44.
0.65	7.1	45.
0.66	7.3	46.
0.67	7.5	47.
0.68	7.7	48.
0.69	7.9	49.
0.70	8.0	51.
0.71	8.2	52.
0.72	8.4	53.
0.73	8.6	54.
0.74	8.8	55.
0.75	9.0	57.
0.76	9.2	58.
0.77	9.4	59.
0.78	9.6	60.
0.79	9.8	62.
0.80	10.0	63.
0.81	10.2	64.
0.82	10.4	66.
0.83	10.6	67.
0.84	10.8	68.
0.85	11.1	70.
0.86	11.3	71.
0.87	11.5	72.
0.88	11.7	74.
0.89	11.9	75.
0.90	12.1	76.
0.91	12.3	78.
0.92	12.6	79.
0.93	12.8	80.
0.94	13.0	82.
0.95	13.2	83.
0.96	13.4	84.
0.97	13.6	86.
0.98	13.8	87.
0.99	14.0	88.
1.00	14.2	90.
1.01	14.4	91.
1.02	14.7	92.
1.03	14.9	93.
1.04	15.1	95.
1.05	15.3	96.
1.06	15.5	97.
1.07	15.7	99.
1.08	15.9	100.
1.09	16.1	101.
1.10	16.3	102.
1.11	16.5	104.
1.12	16.7	105.
1.13	16.9	106.
1.14	17.1	107.
1.15	17.3	109.
1.16	17.5	110.
1.17	17.7	111.
1.18	17.8	112.
1.19	17.8	112.

BILGE TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
0.0	0.0 (1.2)	0 (8.)
0.01	1.3	8.
0.02	1.5	9.
0.03	1.6	10.
0.04	1.7	11.
0.05	1.9	12.
0.06	2.0	13.
0.07	2.2	14.
0.08	2.3	14.
0.09	2.5	15.
0.10	2.6	16.
0.11	2.8	17.
0.12	2.9	18.
0.13	3.1	19.
0.14	3.2	20.
0.15	3.4	21.
0.16	3.5	22.
0.17	3.7	23.
0.18	3.9	24.
0.19	4.0	25.
0.20	4.2	26.
0.21	4.3	27.
0.22	4.5	28.
0.23	4.7	29.
0.24	4.9	31.
0.25	5.0	32.
0.26	5.2	33.
0.27	5.4	34.
0.28	5.6	35.
0.29	5.7	36.
0.30	5.9	37.
0.31	6.1	38.
0.32	6.3	40.
0.33	6.5	41.
0.34	6.7	42.
0.35	6.8	43.
0.36	7.0	44.
0.37	7.2	45.
0.38	7.4	47.
0.39	7.6	48.
0.40	7.8	49.
0.41	8.0	50.
0.42	8.2	52.
0.43	8.4	53.
0.44	8.6	54.
0.45	8.8	55.
0.46	9.0	57.
0.47	9.2	58.
0.48	9.4	59.
0.49	9.6	60.
0.50	9.8	62.
0.51	10.0	63.
0.52	10.2	64.
0.53	10.4	66.
0.54	10.7	67.
0.55	10.9	68.
0.56	11.1	70.
0.57	11.3	71.
0.58	11.5	72.
0.59	11.7	74.
0.60	11.9	75.
0.61	12.2	76.
0.62	12.4	78.
0.63	12.6	79.
0.64	12.8	81.
0.65	13.0	82.
0.66	13.3	83.
0.67	13.5	85.
0.68	13.7	86.
0.69	13.9	88.
0.70	14.2	89.
0.71	14.4	91.
0.72	14.6	92.
0.73	14.9	93.
0.74	15.1	95.
0.75	15.3	96.
0.76	15.6	98.
0.77	15.8	99.
0.78	16.0	101.
0.79	16.3	102.
0.80	16.5	104.
0.81	16.7	105.
0.82	17.0	107.
0.83	17.2	108.
0.84	17.5	110.
0.85	17.7	111.
0.86	17.9	113.
0.87	18.2	114.
0.88	18.4	116.
0.89	18.7	117.
0.90	18.9	119.
0.91	19.2	121.
0.92	19.4	122.
0.93	19.7	124.
0.94	19.9	125.
0.95	20.2	127.
0.96	20.4	128.
0.97	20.7	130.
0.98	20.9	132.
0.99	21.2	133.
1.00	21.4	135.
1.01	21.7	136.
1.02	21.9	138.
1.03	22.2	140.
1.04	22.5	141.
1.05	22.7	143.
1.06	23.0	145.
1.07	23.2	146.
1.08	23.5	148.
1.09	23.8	149.
1.10	24.0	151.
1.11	24.3	153.
1.12	24.6	154.
1.13	24.8	156.
1.14	25.1	158.
1.15	25.4	159.
1.16	25.6	161.
1.17	25.9	163.
1.18	26.2	164.
1.19	26.4	166.
1.20	26.7	168.
1.21	27.0	170.
1.22	27.2	171.
1.23	27.5	173.
1.24	27.8	175.
1.25	28.0	176.
1.26	28.3	178.
1.27	28.6	180.
1.28	28.9	182.
1.29	29.1	183.
1.30	29.4	185.
1.31	29.7	187.
1.32	30.0	188.
1.33	30.3	190.
1.34	30.5	192.
1.35	30.8	194.
1.36	31.1	196.
1.37	31.4	197.
1.38	31.7	199.
1.39	31.9	201.
1.40	32.2	203.
1.41	32.5	204.
1.42	32.8	206.
1.43	33.1	208.
1.44	33.4	210.
1.45	33.6	212.
1.46	33.9	213.
1.47	34.2	215.
1.48	34.5	217.
1.49	34.8	219.
1.50	35.1	221.
1.51	35.4	222.
1.52	35.7	224.
1.53	36.0	226.
1.54	36.2	228.
1.55	36.5	230.
1.56	36.8	232.
1.57	37.1	233.
1.58	37.4	235.
1.59	37.7	237.

BILGE TK.

SOUND DEPTH (M)	CAPACITY (CUB.M)	CAPACITY (BARREL)
1.60	38.0	239.
1.61	38.3	241.
1.62	38.6	243.
1.63	38.9	245.
1.64	39.2	246.
1.65	39.5	248.
1.66	39.8	250.
1.67	40.1	252.
1.68	40.4	254.
1.69	40.7	256.
1.70	41.0	258.
1.71	41.3	260.
1.72	41.6	262.
1.73	41.9	263.
1.74	42.2	265.
1.75	42.5	267.
1.76	42.8	269.
1.77	43.1	271.
1.78	43.4	273.
1.79	43.7	275.
1.80	44.0	277.
1.81	44.3	279.
1.82	44.6	281.
1.83	44.9	283.
1.84	45.3	285.
1.85	45.6	287.
1.86	45.9	288.
1.87	46.2	290.
1.88	46.5	292.
1.89	46.8	294.
1.90	47.1	296.
1.91	47.4	298.
1.92	47.7	300.
1.93	48.0	302.
1.94	48.4	304.
1.95	48.7	306.
1.96	49.0	308.
1.97	49.3	310.
1.98	49.6	312.
1.99	49.9	314.
2.00	50.2	316.
2.01	50.6	318.
2.02	50.9	320.
2.03	51.2	322.
2.04	51.5	324.
2.05	51.8	326.
2.06	52.2	328.
2.07	52.5	330.
2.08	52.8	332.
2.09	53.1	334.
2.10	53.4	336.
2.11	53.7	338.
2.12	54.1	340.
2.13	54.4	342.
2.14	54.7	344.
2.15	55.0	346.
2.16	55.4	348.
2.17	55.7	350.
2.18	56.0	352.
2.19	56.3	354.
2.20	56.7	356.
2.21	57.0	358.
2.22	57.3	360.
2.23	57.6	362.
2.24	58.0	364.
2.25	58.3	367.
2.26	58.6	369.
2.27	58.9	371.
2.28	59.3	373.
2.29	59.6	375.
2.30	59.9	377.
2.31	60.3	379.
2.32	60.6	381.
2.33	60.9	383.
2.34	61.2	385.
2.35	61.6	387.
2.36	61.9	389.
2.37	62.2	391.
2.38	62.4	392.
2.39	62.4	392.

APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL					3 Jul '86	T-8-2		
					4 Dec '86	T-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

MANAGER: STRUCTURE DESIGN SEC.
SEC.CHIEF / ASS'T CHIEF / CHARGE ENG'R / STAFF / DATE (TEL)

断面係数計算書
SECTION MODULUS CALCULATION

JOB NO. TS1323/24/25 — SCALE — — LYKES REF. NO. 290116 — MITSUI DRAWING NO. 2100901
JOBCLASSIF.NO.

(9 SHEETS WITH COVER)

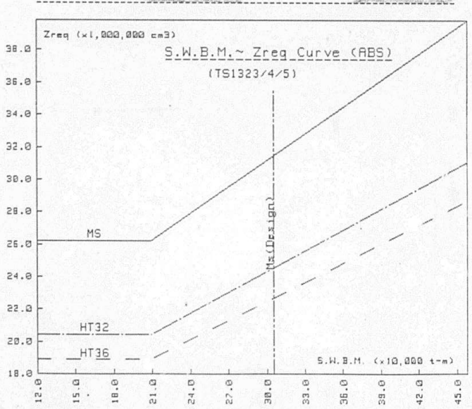
PLAN RECORD			
ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		"PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325."	NOV. 28.'86

DWG.NO. 2100901 - 2/9

***** Required Section Modulus (ABS Rule) ***** TS1323/4/5
~~1984 Rule (4- 6'84 VER)~~
"PROPOSED CHANGE FOR 1985 RULES"

```
Lpp ----------------- 245.000 (m)
Lwl ----------------- 249.100 (m)
Lscant -------------- 241.627 (m)
B ------------------- 32.200 (m)
D ------------------- 18.800 (m)
Cb ------------------ .645
Cbscant ------------- .654
C1 ------------------ 1.030E+01
C2 ------------------ 1.730E-02
He ------------------ 7.758E+00
Cst ----------------- 5.440E-03
fp ------------------ 1.830E+00
Kb ------------------ 1.073E+00
Ms(Input) ----------- 305,400 (t-m)
Ms(Zmin) ------------ 209,125 (t-m)
Mw ------------------ 270,790 (t-m)
Ireq (HT) -----------223,134,061 (cm4)
```

	MILD STEEL	HT-32	HT-36
Z m i n (cm3)	26,228,490	20,458,222	18,884,513
Z (cm3)	31,490,154	24,562,320	22,672,911
Z r e q (cm3)	31,490,154	24,562,320	22,672,911



(3/9)

1) REQUIRED SECTION MODULUS AMIDSHIPS

(a) DECK SECTION MODULUS (HT-36)

SM(HT) = ~~22.672~~ 22.673 x 10^6 (cm^3)

(b) BOTTOM SECTION MODULUS (MS)

SM = ~~31.489~~ 31.490 x 10^6 (cm^3)

2) ACTUAL SECTION MODULUS

ACT. I/y DK = 22.6836 x 10^6 cm^3 (~~100.051~~ 100.047 % of RULE REQ.)

ACT. I/y BTM = 31.5172 x 10^6 cm^3 (~~100.089~~ 100.085 % of RULE REQ.)

3) ALLOWABLE STILL WATER BENDING MOMENT

Ms allow. = ACT.(I/y) x fp - Mw

= 22.6836 x 10^6 / 0.72 x ~~1.663~~ 1.830 x 10^{-2} - 270.790

= ~~253,100~~ 305,400 T-M (APPLIED FOR PROPOSED CHANGE FOR 1985 RULES)

Allowable still water bending moment is limited 287,500 t-m at the aft of NO.4 Hold because of combined stress analysis.
(Refer to COMBINED STRESS ANALYSIS Dwg No.2100916A)

(4/9)

(6/9)

TS1323

* * * CALCULATION OF SECTION MODULUS * * *

- ABOVE A.N.A -

ASSUMED N.A. 10.000 ABOVE B.L.

OR ITEMS	SCANTLINGS (MM)	NO	A (MM2)	L (M)	A X L	A X L2	H (M)	SELF I
21 C.G. F(P.L)	200 X 14.0	0.25	700	6.550	4584	30031	0.200	2
	-TOTAL-		903080		5753988	40975344		316121

(8/9)

TS1323

* * * CALCULATION OF SECTION MODULUS * * *

- BELOW A.N.A -

ASSUMED N.A. 10.000 ABOVE B.L.

OR ITEMS	SCANTLINGS (MM)	NO	A (MM2)	L (M)	A X L	A X L2	H (M)	SELF I
21 I.B.L.1--3	200 X 90 X 9/14	3.0	8898	-8.346	-74262	619793	0.200	29
22 I.B.L.5--16	350 X 100 X 12/17	9.0	51966	-8.430	-438072	3692940	0.350	530
	-TOTAL-		1304319		-10460082	92096928		633726

(5/9)

TS1323

* * * CALCULATION OF SECTION MODULUS * * *

- ABOVE A.N.A -

ASSUMED N.A. 10.000 ABOVE B.L.

OR ITEMS	SCANTLINGS (MM)	NO	A (MM2)	L (M)	A X L	A X L2	H (M)	SELF I
1 UPP.DK.PL.	2715 X 42.0	1.0	114030	8.833	1007224	8896795	0.0	0
2 SHEER STRAKE	2500 X 42.0	1.0	105000	7.700	808497	6225417	2.500	54687
3 SIDE SHELL 1	2000 X 30.0	1.0	60000	5.450	326998	1782136	2.000	20000
4 SIDE SHELL 2	4450 X 18.0	1.0	80100	2.225	178222	396543	4.450	132180
5 L.BHD. 1	2500 X 41.0	1.0	102500	7.578	776742	5886142	2.500	53385
6 L.BHD. 2	2000 X 30.0	1.0	60000	5.328	319678	1703241	2.000	20000
7 L.BHD. 3	2000 X 18.0	1.0	36000	3.328	119807	398719	2.000	12000
8 L.BHD. 4	2600 X 12.0	1.0	31200	1.028	32073	32971	2.600	17575
9 UPP.DK.L.	480 X 40.0	2.0	38400	8.578	329394	2825538	0.480	737
10 UPP.DK.L.	600 X 40.0	1.0	24000	8.511	204263	1738482	0.600	719
11 UPP.DK.L.F.P	200 X 40.0	1.0	8000	8.191	65527	536737	0.0	0
12 L.L. 1	300 X 40.0	1.0	12000	7.983	95795	764735	0.0	0
13 S.L. 1	480 X 40.0	1.0	19200	7.980	153215	1222657	0.0	0
14 S.L. & L.L.	480 X 40.0	6.0	115200	6.780	781053	5295527	0.0	0
15 LOW.DK.	2670 X 20.0	1.0	53400	5.310	283552	1505660	0.0	0
16 LOW.DK.LONG.	350 X 25.0	3.0	26250	5.125	134531	689472	0.350	267
17 CR.GIRDER W	2500 X 14.0	0.25	8750	7.700	67374	518784	2.500	4557
18 CR.GIR. F(U)	730 X 20.0	0.25	3650	8.963	32714	293222	0.0	0
19 CR.GIR. F(L)	730 X 20.0	0.25	3650	6.440	23505	151377	0.0	0
20 C.G. F(P.U)	300 X 14.0	0.25	1050	8.800	9239	81311	0.300	7

(7/9)

TS1323

* * * CALCULATION OF SECTION MODULUS * * *

- BELOW A.N.A -

ASSUMED N.A. 10.000 ABOVE B.L.

OR ITEMS	SCANTLINGS (MM)	NO	A (MM2)	L (M)	A X L	A X L2	H (M)	SELF I
1 BTM.PL.	13100 X 29.0	1.0	379900	-10.014	-3804310	38096272	0.0	0
2 BILGE STRAKE	1240 X 29.0	1.0	35960	-9.920	-356722	3538679	0.0	0
3 BILGE STRAKE	2350 X 24.5	1.0	57575	-9.050	-521052	4715515	1.630	12747
4 BILGE STRAKE	1149 X 18.0	1.0	20682	-7.567	-156500	1184234	1.120	2161
5 SIDE SHELL	7000 X 18.0	1.0	126000	-3.500	-441000	1543500	7.000	514500
6 L.BHD 5	2600 X 13.5	1.0	35100	-1.572	-55177	86737	2.600	19772
7 L.BHD 6	2600 X 14.5	1.0	37700	-4.172	-157283	656184	2.600	21237
8 L.BHD 7	2722 X 15.5	1.0	42191	-6.833	-288290	1969881	2.722	26050
9 INN.BTM.PL.	15845 X 16.0	1.0	253520	-8.202	-2079365	17054896	0.0	0
10 CR.GIR	1790 X 18.0	0.5	16110	-9.105	-146681	1335529	1.790	4301
11 SIDE GIR.	1790 X 12.0	4.0	85920	-9.105	-782299	7122825	1.790	22941
12 STIFF.1	150 X 90 X 9	1.0	2094	-9.420	-19725	185813	0.0	0
13 STIFF.2	150 X 90 X 9	1.0	2094	-8.820	-18469	162896	0.0	0
14 SIDE GIR.	1790 X 18.0	1.0	32220	-9.105	-293362	2671059	1.790	8602
15 NO.1 H.GIR.	2688 X 10.0	1.0	26880	-0.415	-11155	4629	0.0	0
16 DO. (HOLE)	-400 X 10.0	1.0	-4000	-0.415	1659	-688	0.0	0
17 NO.2 H.GIR.	2688 X 10.0	1.0	26880	-5.600	-150527	842950	0.0	0
18 DO. (HOLE)	-400 X 10.0	1.0	-4000	-5.600	22399	-125439	0.0	0
19 BTM.L.1--3	200 X 90 X 9/14	3.0	8898	-9.864	-87769	865758	0.200	29
20 BTM.L.5--16	400 X 100 X 13/18	9.0	61731	-9.754	-602122	5873094	0.400	823

TS1323

REQUIRED SECTION MODULUS (CUB.CM) - I/Y (TOP) = 22.6720×10^6 [3] I/Y (BTM) = 31.4880×10^6 [90]

* * * CALCULATION OF ACTUAL SECTION MODULUS * * *

- ITEMS -	A	A X L	A X L2	SELF I
ABOVE A.N.A	903080	5753988	40975344	316121
BELOW A.N.A	1304319	-10460082	92096928	633728
- TOTAL -	2207399	-4706094	133072272	949850

REAL NEUTRAL AXIS BELOW ASSUMED Y = -4706094 / 2207399 = -2.132 (M)

$I = 2 \times (134022112 - 2207399 \times 2.132^2) = 247977088$ (MM2-M2)

Y (TOP) = 10.932 (M) Y (BTM) = 7.868 (M)

I/Y (TOP) = 247977088 / 10.932 = 22683584 (CUB.CM) (100.051 [047] PERCENT OF RULE REQ.)

I/Y (BTM) = 247977088 / 7.868 = 31517168 (CUB.CM) (100.089 [085] PERCENT OF RULE REQ.)

(8/9)

TS1323

REQUIRED SECTION MODULUS (CUB.CM) - I/Y (TOP) = 22.6730 x 10^6 I/Y (BTM) = 31.4890 x 10^6

* * * CALCULATION OF ACTUAL SECTION MODULUS * * *

- ITEMS -	A	A X L	A X L2	SELF I
ABOVE A.N.A	903080	5753988	40975344	316121
BELOW A.N.A	1304319	-10460082	92096928	633728
- TOTAL -	2207399	-4706094	133072272	949850

REAL NEUTRAL AXIS BELOW ASSUMED Y = -4706094 / 2207399 = -2.132 (M)

I = 2 X (134022112 - 2207399 X 2.132^2) = 247977088 (MM2-M2)

Y (TOP) = 10.932 (M) Y (BTM) = 7.868 (M)

I/Y (TOP) = 247977088 / 10.932 = 22683584 (CUB.CM) (100.~~051~~ 047 PERCENT OF RULE REQ.)

I/Y (BTM) = 247977088 / 7.868 = 31517168 (CUB.CM) (100.~~089~~ 085 PERCENT OF RULE REQ.)

(9/9)

1199

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL								
A	FEB. 10 1986	OFTS/MES-1197						

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. **1325** — SHIP'S NAME **TILLIE LYKES**

CO-ORDINATION SECTION

APL MODIFICATION

TRIM TABLE

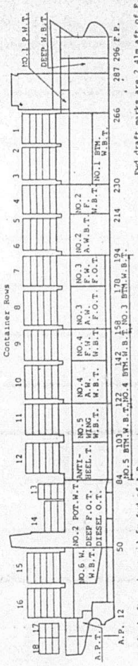
LCB NO. TS1323/24/25 — SCALE — LYKES REF. NO. 290201 — MITSUI DRAWING NO. 1102090M

(3 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	NOV. 10, 1986 K.A. MA
		REVISED FOR APL MODIFICATION	MAR. 3, 1987 K.A.

TRIM TABLES



Location	7.0 m Draft		9.0 m Draft		11.0m Draft	
	Fwd	Aft	Fwd	Aft	Fwd	Aft
DEEP W.B.T.	0.12	-0.07	0.10	-0.06	0.08	-0.04
NO.1 POT.W.T. P/S	0.11	-0.06	0.09	-0.05	0.08	-0.04
ROW 1 40'S	0.10	-0.05	0.08	-0.04	0.07	-0.03
NO.1 BTM.W.B.T.	0.09	-0.05	0.08	-0.04	0.07	-0.03
ROW 2 20'S	0.09	-0.05	0.07	-0.04	0.06	-0.03
ROW 3 20'S	0.08	-0.04	0.07	-0.03	0.06	-0.02
ROW 4 40'S	0.07	-0.03	0.06	-0.02	0.05	-0.02
NO.2 F.W.B.T. P/S	0.07	-0.03	0.06	-0.02	0.05	-0.02
ROW 5 20'S	0.06	-0.02	0.05	-0.02	0.05	-0.01
NO.2 A.W.B.T. P/S	0.06	-0.02	0.05	-0.01	0.04	-0.01
ROW 6 20'S	0.05	-0.02	0.05	-0.01	0.04	-0.01
ROW 7 40'S	0.04	-0.01	0.04	0.00	0.04	0.00
NO.3 F.W.F.O.T. P/S	0.04	-0.01	0.04	0.00	0.04	0.00
NO.3 BTM.W.B.T. P/S	0.04	0.00	0.03	0.00	0.03	0.00
ROW 8 40'S	0.03	0.00	0.03	0.00	0.03	0.00
NO.3 A.W.F.O.T. P/S	0.03	0.01	0.03	0.00	0.03	0.00
ROW 9 40'S	0.02	0.02	0.02	0.01	0.02	0.01
NO.4 F.W.W.B.T. P/S	0.02	0.02	0.02	0.01	0.02	0.01
NO.4 BTM.W.B.T. P/S	0.01	0.02	0.01	0.02	0.01	0.02
ROW 10 40'S	0.01	0.03	0.01	0.02	0.01	0.02
NO.4 A.W.W.B.T. P/S	0.01	0.03	0.01	0.02	0.01	0.02
ROW 11 40'S	-0.01	0.04	0.00	0.03	0.00	0.03
NO.5 WING W.B.T. P/S	-0.01	0.04	0.00	0.03	0.00	0.03
NO.5 BTM.W.B.T. P/S	-0.01	0.05	-0.01	0.04	0.00	0.03
ROW 12 40'S	-0.02	0.05	-0.01	0.04	-0.01	0.03
ANTI-HEELING T. P/S	-0.02	0.05	-0.01	0.04	-0.01	0.03
DEEP F.O.T. P	-0.03	0.06	-0.02	0.05	-0.01	0.04
ROW 13 20'S	-0.03	0.06	-0.02	0.05	-0.01	0.04
DEEP F.O.T. S	-0.03	0.06	-0.02	0.05	-0.01	0.04
DIESEL OIL T. P	-0.03	0.07	-0.03	0.05	-0.02	0.04
DIESEL OIL T. S	-0.04	0.07	-0.03	0.06	-0.02	0.04
ROW 14 40'S	-0.04	0.07	-0.03	0.06	-0.02	0.04
NO.2 POT.W.T.	-0.04	0.07	-0.03	0.06	-0.02	0.04
NO.6 WING W.B.T. P/S	-0.06	0.09	-0.04	0.07	-0.03	0.05
ROW 15 40'S	-0.06	0.09	-0.04	0.07	-0.03	0.05
ROW 16 40'S	-0.07	0.10	-0.05	0.08	-0.04	0.06
AFT PEAK T. P/S	-0.08	0.11	-0.06	0.09	-0.05	0.07
ROW 17 20'S	-0.08	0.11	-0.06	0.09	-0.05	0.07
ROW 18 20'S	-0.08	0.11	-0.06	0.09	-0.05	0.07

The above table shows correction in meters to draft fwd and aft for each 100 tonnes loaded at any location.

When discharging, use the table as for loading, but reverse the plus and minus signs.

EXAMPLE: Find the change in draft readings after discharging 100 tonnes in DEEP W.B.T. Initial draft fwd = 8.7 m; initial draft aft = 9.3 m. Use the 9.0 m draft table. Corrections = 0.10 fwd, -0.06 aft. New draft readings are 8.80 m fwd and 9.24 m aft.

1200

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL					JAN. 9 '84	TEL. COMMENT		
REV. A	MAR. 19 '85	OTT/MES-201						

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

FINISHED PLAN

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. **1325** — SHIP'S NAME **TILLIE LYKES**

CO-ORDINATION SECTION
SEC. CHIEF: Kawasaki
ASSIST. CHIEF: N. Ogano
CHARGE ENG'R
STAFF: K. Azuma
DATE (TEL)

FREEBOARD CALCULATION

ABS (TOKYO) / OWNER / OF / TO / MK (2/8)

JOB NO. TS1323/24/25	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
JOBCLASSIF. NO.	—	290202	1102035

(6 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE	Nov. 10, 1986
		APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	K.A. MA

GENERAL NOTE

THE VESSEL HAS A VERY HIGH FREEBOARD SO THAT THE UNDER DECK PASSAGE IS ASSUMED AS FREEBOARD DECK IN THIS CALCULATION.

(1) General

Nationality	U.S.A.
Type of Ship (Type for Freeboard)	Type "B" Ship Complete Superstructure Vessel
Freeboard Deck (Assumed)	Passage Deck

(2) Principal Particulars, etc.

Length between Perpendicular	Lpp	245.000 m
Length for Freeboard	Lf	245.020 m
Breadth moulded	B	32.200 m
Depth moulded (To Main Deck)		18.800 m
Depth moulded (To Passage Deck)		15.300 m
Stringer Plate Thickness		0.0 m
Depth for Freeboard	Df	15.300 m
Scantling draft moulded		11.880 m
Keel Plate Thickness		0.040 m
Scantling draft extreme		11.920 m
Actual Bow Height		10.570 m

(3) Freeboard Calculation

1) Tabular Freeboard

For Table "B": 3,949 + 16 x 0.02 = 3,949 mm (+)

Correction for Block Coefficient: Nil

(C_B = 0.669 < 0.68)

2) Depth Correction

$(Df - \frac{Lf}{15}) \times 250$

$= (15.300 - \frac{245.020}{15}) \times 250 = (-)\ 259$ mm

1201

3) Superstructure Correction

Effective Length of Superstructure: E = 245.020 m

E/Lf = 1.0

Coefficient = 1.0

Superstructure Correction: 1.0 x 1,070 = 1,070 mm (-)

4) Sheer Correction

. Standard Mean Sheer Height

$12.51 \times (Lf/3 + 10) = 12.51 \times (\frac{245.020}{3} + 10)$

= 1,147 mm

. Actual Mean Sheer Height

Station	Sheer	Products
AP	*1 1,200 mm x 1	1,200
1/6 Lf	533 mm x 3	1,599
2/6 Lf	133 mm x 3	399
Midship	0 mm x 2	0
4/6 Lf	232 mm x 3	696
5/6 Lf	928 mm x 3	2,784
FP	*2 2,089 mm x 1	2,089
		8,767 mm

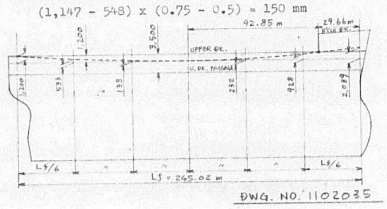
*1 Z = Actual Height - Standard Height = 3,500 - 2,300 = 1,200 mm

*2 $Zv = Z(\frac{Lf}{2\ell})^2 = 1,200 \times (\frac{245.02}{2 \times 92.85})^2 = 2,089$ mm

Actual Mean Sheer Height: 8,767/16 = 548 mm

Sheer Correction :

(1,147 - 548) x (0.75 - 0.5) = 150 mm



5) Summer Freeboard

Tabular Freeboard	(+)	3,949 mm
Depth Correction	(-)	259 mm
Superstructure Correction	(-)	1,070 mm
Sheer Correction	(+)	150 mm
Summer Freeboard		2,770 mm

6) Summer Draft

Freeboard Depth	15,300 mm
Summer Freeboard	2,770 mm
Draft Moulded	12,530 mm
Keel Plate Thickness	40 mm
Draft Extreme	12,570 mm

7) Minimum Bow Height

Required Minimum Bow Height :

$56 \times Lf \times (1 - Lf/500) \times \frac{1.36}{Cb + 0.68}$

$= 56 \times 245.02 \times (1 - \frac{245.02}{500}) \times 1.0 = 6,997$ mm

NOTE : Assigned Freeboard is 3,440 mm from top of steel second deck at side, which corresponds to moulded draft 11.88 m.

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	24 NOV '86	OPFS/MES-1291			10 NOV '86	T-5-2 JC/KL		

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

FINISHED PLAN

SHIP DESIGN DEPARTMENT
MANAGER

SHIP'S NO. **1325**

SHIP'S NAME **TILLIE LYKES**

CO-ORDINATION SECTION
SEC. CHIEF
ASSIST. CHIEF
CHARGE ENG'R
STAFF
DATE (TEL)

STABILITY TEST DATA

(CALCULATION OF LIGHTSHIP WEIGHT AND ITS LONGITUDINAL AND TRANSVERSE CENTER OF GRAVITY.)

JOB NO. TS1323/24/25
JOBCLASSIF. NO.
SCALE —
LYKES REF. NO. 290302
MITSUI DRAWING NO. 1102205

(29 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. NO. 1325 AS FINISHED PLAN.	NOV. 10, 1986 K.A.

1203

DEPARTMENT OF TRANSPORTATION
U. S. COAST GUARD
CG-993 (Rev. 7-67)

UNITED STATES COAST GUARD

STABILITY TEST DATA

(CALCULATION OF LIGHTSHIP WEIGHT AND ITS LONGITUDINAL AND TRANVERSE CENTER OF GRAVITY)

MV "TILLIE LYKES"

OFFICIAL No. ....

Gross tons ....

Description of vessel: CONTAINER SHIP
Type: FLUSH DECKER WITH FORECASTLE
Builder: MITSUI ENGINEERING & SHIPBUILDING CO., LTD. TAMANO WORKS
Hull No.: S1325 Date Built: NOV., 1986
Hull: STEEL

Machinery: TWO-STROKE, SINGLE-ACTING, CROSSHEAD, DIRECT-REVERSIBLE, TURBOCHARGED DIESEL ENGINE, MITSUI B&W 9L80MCE × 1 SET, MCR 28800 PS × 82.0 RPM

Classed by: ABS Inspected ☑ Safety certificate ☑ Load line ☑
Route: Ocean ☑ Coastwise ☐ Great Lakes ☐ Bays ☐ Rivers ☐
Specify route, if limited ....

Owner: LYKES BROS STEAMSHIP CO., INC.
Owner's address: NEW ORLEANS, LOUISIANA, USA

Vessel inclined at: MITSUI ENGINEERING & SHIPBUILDING CO., LTD. TAMANO WORKS
Date: 7TH OCTOBER, 1986 Time: 8:30 ~ 12:00
Test requested by: OWNER / USCG

Plans furnished by: MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
Offsets measured by: DO
Curves of form computed by: DO

Test conducted by: MITSUI ENGINEERING & SHIPBUILDING CO., LTD. TAMANO WORKS
Stability calculations made by: DO

Duplicate vessels: HULL NO. S1323 & S1324

Previous Edition May Be Used
U. S. GOVERNMENT PRINTING OFFICE 16—35871-4
GPO 851-361

CG-993-1 (Rev. 12-52)
TREASURY DEPARTMENT
U. S. Coast Guard

STABILITY TEST — MY "TILLIE LYKES"

PRINCIPAL DIMENSIONS

Item	Value	inches	feet
Length over all	259.0 M	inches (	feet).
Length between perpendiculars which are at the extremities of 11.920 M water line	245.000 M	inches (	feet).
Length between draft marks, ... condition	241.090 M	inches (	feet).
Breadth, extreme, at 18.800 M .... inches above base	32.284 M	inches (	feet).
Breadth, molded, ¤ at 11.880 M .... inches above base	32.200 M	inches (	feet).
Breadth at load water line MOLDED	32.200 M	inches (	feet).
Depth amidships, from TOP OF KEEL (BASE LINE) to UPPER DECK AT SIDE	18.800 M	inches (	feet).
Apparent full-load mean draft for stability — molded base	11.880 M	inches (	feet).
Apparent full-load mean draft for stability — bottom of keel	11.920 M	inches (	feet).
Displacement, sea water, METRIC TONS (1000 KG) ~~long tons (2,240 lbs.)~~, at above full-load draft	62137 MT		
Freeboard amidships at above full-load draft (FROM FREEBOARD DECK (PASSAGE DECK))	3.440 M	inches (	feet).
Freeboard at low point of sheer (0 M aft of ¤)	3.440 M	inches (	feet).
Location of ports, in hull, which may affect stability	NIL		

GENERAL INFORMATION

Names and duties of official observers	(ABS) MR. J. C. SMITH
Designers represented by	(MES) MR. N. AYANO
Builders represented by	(MES) MR. N. AYANO
Owners represented by	(OCEAN FLEETS) MR. W. D. McCOSS
Weather, tide, and mooring conditions	FINE, NO WIND, NEGLIGIBLE TIDE. MOORED ALONGSIDE NO.2 PIER BY SLACKENED LINES.
Condition of ship as to completeness and as to water in boilers, machinery, and bilges (see note at bottom of sheet 5)	SHIP WAS NEARLY COMPLETED EXCEPT FINAL PAINTING AND OTHER MINOR WORKS AND WITH ALMOST NORMAL LEVEL LIQUID IN ENGINE ROOM.

U. S. GOVERNMENT PRINTING OFFICE 16—25894-9

DEPARTMENT OF TRANSPORTATION
U. S. COAST GUARD
CG-993-2 (Rev. 8-67)

STABILITY TEST MV "TILLIE LYKES"

All tons used in this calculation are of 1000 ~~pounds~~ KG

SHIP AT TIME OF STABILITY TEST—CONDITION O

SEE PAGES 24 & 25

SKETCH SHOWING HOG, SAG, TRIM, DRAG, AND LOCATION OF DRAFT MARKS, FREEBOARDS, AND PERPENDICULARS

(Except where accuracy of draft marks have been verified by U. S. C. G., freeboards must be furnished)

Draft when inclined (check) [V] (From draft marks) [ ] (From freeboards)

			feet	inches
Forward		P	16	7.25
		S	16	8.25
Aft		P	16	9.25
		S	16	10.00
Amidships (Must be recorded)	Port		15	4.50
	Starboard		16	8.50

Distance between "curves of form" perpendiculars 245.000 M ~~feet~~.

Bottom of keel below base line 40 MM ~~inches~~.

~~Molded~~ Keel drafts corrected to "curves of form" perpendiculars for use in calculations.

	M	feet
Forward	5.073 M	16.644 *
Aft	5.122 M	16.803 *
Mean of amidships P and S	4.890 M	16.042

Mean of forward and after drafts	5.098	M ~~feet~~
Hog ~~or sag~~	0.208	M ~~feet~~
Trim ~~forward~~, aft	0.049	M ~~feet~~
Longitudinal center of flotation ~~forward~~, aft ⊠	5.36	M ~~feet~~
Molded Keel draft at center of flotation $5.098 + 0.049 \times \frac{5.36}{245.0}$	5.099	M ~~feet~~
Molded Keel draft at L. C. F. corrected for hog ~~or sag~~ $5.099 - 0.158$ **	4.941	M ~~feet~~
Total displacement at above draft ~~F. W.~~, S. W. S.G. 1.025	20265	MT ~~tons~~
Specific gravity of water 1.0222 equals	—	cubic feet per ton.
Total displacement corrected for density	20210	MT ~~tons~~

PREVIOUS EDITION MAY BE USED

* SEE PAGE 23

** 0.208 × 0.762
↳ FROM APPENDIX D "HOG AND SAG CORRECTION FACTORS" OF NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 15-81 (16 DEC. 1981)

GPO 961-126

TREASURY DEPARTMENT
U. S. COAST GUARD
CG-993-6 (Rev. 12-59)

STABILITY TEST MV "TILLIE LYKES"

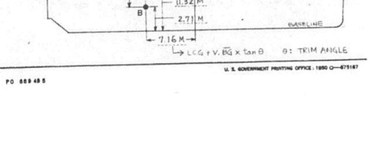
SHIP AT TIME OF STABILITY TEST—CONDITION O

	From hydrostatic curves	From independent calculation
Corrected displacement	20210 MT ~~tons~~	______ tons.
Mean virtual metacentric height obtained from plot of inclining moments versus tangents of angles of heel ($\frac{\text{moment}}{\text{displacement} \times \text{tangent}}$)	— feet.	______ feet.
Correction for free surface	— feet.*	______ feet.
Mean metacentric height G. M. =	— feet.	______ feet.
Transverse metacenter above base line corresponding to draft at L. C. F. (corrected for hog or sag)	19.59 M ~~feet~~.†	
Transverse metacenter above base line corrected (for trim, and hog or sag)	19.59 M ~~feet~~.	
C. G. above base line	11.32 M ~~feet~~. (SEE PAGE 5)	______ feet. (From figure)
Longitudinal metacenter above C. G. (LKM − KG = 647.4 − 11.32)	636.08 M ~~feet~~.	
Moment to alter trim 1 ~~foot~~ M, $\frac{\text{Longl. GM} \times \Delta}{L}$ ($\frac{636.08 \times 20210}{245.000}$)	52470.1 MT-M ~~ft-tons~~.	
Trim by stern, ~~bow~~	0.049 M ~~feet~~.†	
Trimming lever = $\frac{\text{Trim} \times \text{moment to trim}}{\text{displacement}}$ ($\frac{0.049 \times 52470.1}{20210}$)	0.13 M ~~feet~~.	
L. C. B., ~~forward~~, aft of ⊠, which is 0.300 M ~~feet~~ forward, aft of frame No. 155	7.03 M ~~feet~~.	
C. G. ~~forward~~, aft of ⊠ (7.03 + 0.13)	7.16 M ~~feet~~.	______ feet. (From figure)

Period of complete roll ______ seconds.

Apparent radius of gyration of vessel ______ $x = \frac{T\sqrt{GM}}{1.108}$ ______ feet.

Rolling constant ______ $C = \frac{T\sqrt{GM}}{B}$ ______



↳ LCG + V. $\overline{BG}$ × tan θ   θ: TRIM ANGLE

* Water in bilges. The bilges should be entirely free of water; but should this be impossible, correction should be made in the derived G. M. The details of this correction should form part of this report.
† If the trim is excessive, independent calculations should be made to obtain the positions of center of buoyancy and transverse metacenter and the position of the center of gravity determined therefrom. These calculations should be incorporated in this booklet. *(See Page 2a)*

PREVIOUS EDITIONS ARE OBSOLETE

PO 889 495

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1205

TREASURY DEPARTMENT
U.S. COAST GUARD
CG-993-12 (Rev. 12-59)

STABILITY TEST MV "TILLIE LYKES"

TRANSVERSE CENTER OF GRAVITY AT DRAFT MEASUREMENT;

TRANSVERSE METACENTER ABOVE C.G.		8.27	M
MOMENT TO ALTER HEEL 1 M = $\frac{\text{TRANS. GM} \times \Delta}{\text{B(EXT.)}}$	$\frac{8.27 \times 20210}{32.236}$	5184.8	MT-M
HEEL TO STARBOARD	16 FEET 8.50 INCHES − 15 FEET 4.50 INCHES = 16.00 INCHES	0.406	M
HEELING LEVER = $\frac{\text{HEEL} \times \text{MOMENT TO HEEL}}{\text{DISPLACEMENT}}$	$\frac{0.406 \times 5184.8}{20210}$	0.10	M
T.C.B.		0.0	M
∴ C.G. STBD. OF SHIP'S CENTER LINE	0.10 − 0.0	0.10	M

U.S. GOVERNMENT PRINTING OFFICE 514502-4

DEPARTMENT OF TRANSPORTATION
U. S. COAST GUARD
CG-993-9 (Rev. 7-67)

STABILITY TEST MV "TILLIE LYKES"

SHIP IN CONDITION 1

DESCRIPTION OF CONDITION	ITEMS	DISPLACEMENT AND WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.
SHIP COMPLETE IN EVERY RESPECT,	Ship in condition 0	20210		7.16		144704	11.32	*228710		0.10		2021
WITH WATER IN BOILERS AT STEAMING	WEIGHT TO BE TAKEN OUT (WATER & OIL)	-3517				81903		-24750			3399	
LEVEL AND LIQUIDS IN MACHINERY	WEIGHT TO BE TAKEN OUT (MISCELLANEOUS)	-25			1410			-425				5
AND PIPING, BUT WITH ALL TANKS AND	WEIGHT TO BE ADDED (WATER & OIL)	224				19421		1377			433	
BUNKERS EMPTY AND NO PASSENGERS,	WEIGHT TO BE ADDED (MISCELLANEOUS)	25			569			460				2
CREW, CARGO, STORES OR BAGGAGE												
ON BOARD.												
Slack tanks	TOTAL LIGHTSHIP	16917		14.43		244049	**12.14	205372	0.11		1804	

Slack tanks: BTM. L.O. SUMP T. 33 MT-M (SEE PAGE 20)

Correction for free surface 0.0 M

Keel draft at longitudinal center of flotation corresponding to the above displacement for SEA water	4.28	M
Transverse metacenter above base at L. C. F. draft, uncorrected for trim	21.25	M
Transverse metacenter above base corrected for trim $21.25 + \frac{2.46 \times 32.20^2}{245.00 \times 10 \times 4.23}$	21.50	M
C. G. above base	12.14	M
Metacentric height, uncorrected for free surface (corrected for trim) G. M	9.36	M
Metacentric height, corrected for free surface (corrected for trim) G. M	9.36	M

Longitudinal metacenter above C. G. at L. C. F. draft	720.2 − 12.14	708.06	M
Moment to alter trim 1 M at L. C. F. draft, $\frac{\text{Longl. GM} \times \Delta}{L}$		48890.8	MT-M
C. B. of ship on even keel at L. C. F. draft, aft of ⊠		7.32	M
C. G., aft of ⊠		14.43	M
Trimming lever		7.11	M
Trim, aft, $\frac{\text{Displacement} \times \text{Lever}}{\text{Moment to Trim}}$		2.46	M

Longitudinal center of flotation, aft of ⊠	5.47	M
Difference between L. C. F. and ⊠ draft	0.05	M
KEEL draft amidships	4.23	M
Draft on draft marks, forward (AT FP 3.00 M 9'-10.1")	9 feet 11.1 inches	
Draft on draft marks, aft (AT AP 5.46 M 17'-11.0")	17 feet 10.4 inches	

NOTES:-

* CALCULATED ASSUMMING VCG IN CONDITION 1 AS 12.14 M.

** ASSUMED SAME AS PREVIOUS DUPLICATE VESSEL "DOCTOR LYKES" (HULL NO. 1323) SINCE AN INCLINING TEST OF "TILLIE LYKES" (HULL NO. 1325) WAS OMITTED DUE TO THEIR SIMILARITY.

GPO 959-103

PREVIOUS EDITION MAY BE USED

1206

WEIGHT TO BE TAKEN OUT (1/13)

ITEM	LIQUID LEVEL* (M)	DENSITY (MT/M³)	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.	FREE SURFACE (MT-M)
WATER & OIL :~														
CHAIN LOCKER	0.24	1.0222	0.04	109.54		4		14.33	1	1.78		0		0
No.2 FORE W.B.T. (P)	FULL	1.0222	564.25	55.07		31073		7.12	4017	10.07		5682		0
" " " (S)	FULL	1.0222	564.25	55.07		31073		7.12	4017		10.07		5682	0
No.2 AFT W.B.T. (P)	FULL	1.0222	786.99	40.20		31637		6.63	5218	10.88		8562		0
" " " (S)	FULL	1.0222	787.81	40.24		31701		6.63	5223		10.87		8563	0
DEEP F.O.T. (S)	11.632	0.966	358.68		62.01		22242	6.31	2263		11.68		4189	11
D.O. SETT. T.	1.880	0.861	13.95		67.30		939	12.66	177	14.75		206		4
D.O. SERV. T.	1.180	0.861	8.87		67.29		597	15.92	141	14.75		131		4
M/E L.O. STOR. T.	0.760	0.889	5.87		73.70		433	12.10	7	14.75		87		4
F.O. DRAIN T.	0.340	0.966	8.11		60.32		489	0.2[illegible]	2	0		0		293
DIESEL OIL T. (P)	1.250	0.861	24.97		65.82		1644	0.76	19	3.70		92		36
WASTE OIL T.	0.219	1.000	1.60		65.37		105	1.38	2		6.83		11	7
BOTTOM L.O. SUMP T.	0.595	0.889	21.20		72.56		1538	1.00	21	0		0		33
CLEAN DRAIN T.	1.070	1.000	6.40		78.04		499	1.06	7	3.26		21		2
S/T L.O. DRAIN T.	0.390	0.889	2.67		98.88		264	1.88	5	0		0		2
COOLING WATER T.	8.100	1.000	86.30		109.43		9444	4.43	382	0		0		4
H.F.O. SLUDGE T.	0.205	0.966	0.77		61.70		48	7.00	5		1.85		1	2
SUB TOTAL			3242.73			87246			21571				3665	402

NOTE:- LCG : FROM MIDSHIP (⊠) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE
* ALL LEVELS ARE IN SOUNDING.

WEIGHT TO BE TAKEN OUT (2/13)

ITEM	LIQUID LEVEL* (M)	DENSITY (MT/M³)	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.	FREE SURFACE (MT-M)
D.O. SLUDGE T.	0.320	0.861	0.95		61.70		59	7.07	7	0.39		0		1
L.O. SLUDGE T.	0.095	0.889	0.71		60.10		43	6.96	5		0.79		1	11
H.F.O. SETT. T. (P)	1.373	0.966	27.34		60.80		1662	8.91	244	9.49		259		154
" " " (S)	0.267	0.966	0.77		61.29		47	8.11	6		11.62		9	14
H.F.O. SERV. T.	4.155	0.966	60.09		60.58		3640	10.33	621		7.71		463	25
DIST. WATER T.	2.440	1.000	20.90		80.10		1674	12.94	270	14.74		308		5
No.1 POT W.T. (P)	1.450	1.000	30.85	96.35		2972		16.13	498	9.82		303		38
" " (S)	2.040	1.000	49.90	96.45		4813		16.49	823		10.04		501	65
E/R BILGE WELL (P)	0.080	1.000	0.16		59.70		10	1.40	0	5.16		1		0
FWD MACH. RM. B.W.	0.040	1.000	0.02	92.09		2		3.12	0	0		0		0
SUB TOTAL			191.69			652			2474				103	313

NOTE:- LCG : FROM MIDSHIP (⊠) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE
* ALL LEVELS ARE IN SOUNDING.

WEIGHT TO BE TAKEN OUT (3/13)

ITEM	LIQUID LEVEL (M)	DENSITY (MT/M^3)	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.	FREE SURFACE (MT-M)
WATER & OIL IN ENGINE ROOM :~														
BOILER D. O. T.	(0.35) M^3	0.861	0.30		76.9		23	12.5	4	15.2		5		0
EMERG. GEN. F. O. T.	(0.48) M^3	0.966	0.46		83.7		39	22.5	10		6.2		3	0
CAMSHAFT L. O. T.	(1.54) M^3	0.889	1.37		79.7		109	5.0	7		6.2		8	0
CYL. O. MEASURING T.	(0.76) M^3	0.889	0.68		73.7		50	12.4	8		5.2		4	0
STERN TUBE L.O. HEAD T.	(0.193) M^3	0.889	0.17		86.1		14	16.0	3	0.8		0		0
L. O. DRAIN T.	(0.3) M^3	0.889	0.27		70.1		19	2.8	1	8.0		2		0
SCAV. BOX L. O. DRAIN T.	(0.22) M^3	0.889	0.20		73.3		15	2.8	1		5.2		1	0
WASTE OIL SERVICE T.	(0.1) M^3	1.00	0.10		77.7		8	8.7	1	6.6		1	.	0
ENG. ROOM SEWAGE HOLD. T.	0	–	0		66.9		0	4.7	0		11.8		0	0
DEARATION CHAMBER (F.O.)	(0.2) M^3	0.966	0.19		78.9		15	20.0	4	9.6		2		0
F. O. MIXING CHAMBER	(0.2) M^3	0.966	0.19		67.3		13	15.8	[illegible]		5.2		1	0
F. O. PURIF. OPERAT. W. T.	(0.05) M^3	1.00	0.05		62.1		3	12.0	1		2.3		0	0
L. O. PURIF. OPERAT. W. T.	(0.06) M^3	1.00	0.06		60.1		4	[illegible]	1		2.6		0	0
D.O.& L.O. PURIF. OPERAT. W.T.	(0.07) M^3	1.00	0.07		60.5		4	11.1	1	0.7		0		0
F. W. EXPANSION T.	(0.43) M^3	1.00	0.43		79.3		34	26.5	11	3.0		1		0
COOL. F.W. DEARATION T.	(0.16) M^3	1.00	0.16		84.1		13	16.2	3	2.3		0		0
ATMOS. DRAIN T.	(0.95) M^3	1.00	0.95		70.1		67	8.7	8	14.0		13		0
MAIN L.O. COOLERS (2) (L.O.)	(1.17) M^3	0.889	1.04		67.3		70	5.0	5	10.5		11		0
DO. (F.W.)	(1.17) M^3	1.00	1.17		67.3		79	5.0	6	10.5		12		0
STERN TUBE L.O. COOLER (L.O.)	(0.03) M^3	0.889	0.03		102.6		3	5.3	0	1.2		0		0
DO. (F.W.)	(0.01) M^3	1.00	0.01		102.6		1	5.3	0	1.2		0		0
SUB TOTAL			7.90				583		78			30		0

NOTE:- LCG : FROM MIDSHIP (Ø) TCG : FROM SHIP'S CENTER LINE VCG : ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (4/13)

ITEM	LIQUID LEVEL (M)	DENSITY (MT/M^3)	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.	FREE SURFACE (MT-M)
WATER & OIL IN ENGINE ROOM :~														
CAMSHAFT L.O. COOLER (L.O.)	(0.12) M^3	0.889	0.11		80.9		9	5.2	1		7.2		1	0
DO. (F.W.)	(0.04) M^3	1.00	0.04		80.9		3	5.2	0		7.2		0	0
CENTRAL F.W. COOLERS (2) (F.W.)	(1.03) M^3	1.00	1.03		67.3		69	9.0	9	10.0		10		0
DO. (S.W.)	(0.80) M^3	1.0222	0.82		67.3		55	9.0	7	10.0		8		0
AUX. CONDENSER (DRAIN)	FULL	1.00	3.40		73.7		251	6.6	22	11.1		38		0
DO. (S.W.)	(1.60) M^3	1.0222	1.64		73.7		121	6.6	10	11.1		18		0
DRAIN COOLER (DRAIN)	(0.02) M^3	1.00	0.02		69.7		1	10.7	0	14.0		0		0
DO. (S.W.)	(0.006) M^3	1.0222	0.01		69.7		1	10.7	0	14.0		0		0
F. W. GENERATOR (F.W.)	0	–	0		77.3		0	9.3	0	8.6		0		0
DO. (S.W.)	0	–	0		77.3		0	9.3	0	8.6		0		0
AUX. BOILER (F.W.)	(8.7) M^3	1.00	8.70		81.7		711	10.2	89	10.2		89		0
EXH. GAS ECONOMIZER (F.W.)	(3.67) M^3	1.00	3.67		81.7		300	22.3	82	8.0		29		0
FLASHER (F.W.)	(0.5) M^3	1.00	0.50		80.9		40	23.3	12	12.2		6		0
BILGE SEPARATOR (BILGE)	(0.4) M^3	1.00	0.40		77.7		31	5.4	2		8.5		3	0
CALORIFIER (F.W.)	0	–	0		84.1		0	15.8	0		10.8		0	0
AUX. CONDENSER VAC. PUMP UNIT (DRAIN)	(0.14) M^3	1.00	0.14		73.7		10	8.5	1	14.0		2		0
F. W. HYD. UNIT (F.W.)	(0.75) M^3	1.00	0.75		77.7		58	9.1	7		14.4		11	0
SEAL POT OF DIESEL GEN	(0.04) M^3	1.00	0.04		78.7		3	22.0	1	11.4		0		0
SUB TOTAL			21.27				1663		243			185		0

NOTE:- LCG : FROM MIDSHIP (Ø) TCG : FROM SHIP'S CENTER LINE VCG : ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (5/13)

ITEM	LIQUID LEVEL (M)	DENSITY (MT/M^3)	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.	FREE SURFACE (MT-M)
WATER & OIL IN ENGINE ROOM :~														
MAIN ENGINE (L.O.)	M^3 (3.33)	0.889	2.96		73.7		218	6.5	19	0		0		0
DO. (F.O.)	M^3 (0.18)	0.966	0.17		73.7		13	6.5	1	0		0		0
DO. (F.W.)	M^3 (15.69)	1.00	15.69		73.7		1156	6.5	102	0		0		0
NO.1 GEN. DIESEL ENG. (L.O.)	M^3 (1.29)	0.889	1.15		68.9		79	13.0	15	8.0		9		0
NO.2 GEN. DIESEL ENG. (L.O.)	M^3 (1.30)	0.889	1.16		68.9		80	13.0	15	11.3		13		0
NO.3 GEN. DIESEL ENG. (L.O.)	M^3 (1.28)	0.889	1.14		73.7		84	13.0	15	8.0		9		0
TURBO GENERATOR (L.O.)	M^3 (0.38)	0.889	0.34		75.3		26	9.0	3	11.5		4		0
NO.1 GEN. DIESEL ENG. (F.W.)	M^3 (0.34)	1.00	0.34		68.9		23	13.0	4	8.0		3		0
NO.2 GEN. DIESEL ENG. (F.W.)	M^3 (0.34)	1.00	0.34		68.9		23	13.0	4	11.3		4		0
NO.3 GEN. DIESEL ENG. (F.W.)	M^3 (0.34)	1.00	0.34		73.7		25	13.0	4	8.0		3		0
PIPING (L.O.)	M^3 (4.23)	0.889	3.76		72.1		271	[illegible]	26	2.0		8		0
DO. (F.O.)	M^3 (2.60)	0.966	2.51		61.7		155	8.0	20		4.0		10	0
DO. (F.W.)	M^3 (9.37)	1.00	9.37		75.3		706	10.0	94	7.5		70		0
DO. (S.W.)	M^3 (13.50)	1.0222	13.80		64.5		890	4.5	62	3.0		41		0
SUB TOTAL			53.07				3749		384			154		0
WATER & OIL TOTAL			3516.66			81903			24750				3399	715

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG : ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (6/13)

ITEM	NO.	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.
IN ACCOMMODATION :~												
(ON SALOON DECK)												
FIRE EXTINGUISHERS (5)		0.03	99.8		3.0		21.9	0.7		7.4		0.2
(ON CREW DECK)												
FIRE EXTINGUISHERS (4)		0.03	99.8		3.0		24.6	0.7		7.4		0.2
DUST CAN & ASH TRAY		0.01	102.9		1.0		24.6	0.2		14.5		0.1
(ON BOAT DECK)												
FIRE EXTINGUISHERS (4)		0.02	99.8		2.0		27.3	0.5		7.4		0.1
DUST CAN & ASH TRAY		0.01	102.9		1.0		27.3	0.3		14.5		0.1
TOWEL RAILS(NIGHT RELIEF MATE)		0.01	95.9		1.0		27.2	0.3		10.3		0.1
(ON PASSENGER DECK)												
FIRE EXTINGUISHERS (4)		0.03	99.8		3.0		30.0	0.9		7.4		0.2
HOOKS & ASH TRAY		0.03	102.9		3.1		30.0	0.9		14.5		0.4
SUB TOTAL		0.17			17.1			4.5				1.4

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (7/13)

ITEM	NO.	WEIGHT	LCG (M)		LCG MOMENT (MT-M)		VCG	VCG MOMENT	TCG (M)		TCG MOMENT (MT-M)	
		(MT)	FORE	AFT	FORE	AFT	(M)	(MT-M)	PORT	STBD.	PORT	STBD.
(ON SR. OFFICERS DECK)												
FIRE EXTINGUISHERS (6)		0.02	99.8		2.0		32.7	0.7		7.4		0.1
ELECT. CABLE & HOSE ETC.		0.02	102.9		2.1		32.6	0.7		14.5		0.3
(ON NAVIGATION BRI. DECK)												
TOOLS FOR SEA TRIAL		0.05	95.9		4.8		35.5	1.8		0.7		0.0
(ALL ROUND ACCOMMODATION)												
VENEER PLYWOOD SHEETS		0.35	100.6		35.2		28.5	10.0	0		0	
SUB TOTAL		0.44			44.1			13.2				0.4

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (8/13)

ITEM	NO.	WEIGHT	LCG (M)		LCG MOMENT (MT-M)		VCG	VCG MOMENT	TCG (M)		TCG MOMENT (MT-M)	
		(MT)	FORE	AFT	FORE	AFT	(M)	(MT-M)	PORT	STBD.	PORT	STBD.
ON F'CLE DECK :~												
GEAR OIL		0.03	109.6		3.3		22.2	0.7	0		0	
TEMPORARY MOORING LINES		1.28	116.6		149.2		22.4	28.7	0		0	
ON UPPER DECK :~												
AIR HOSE		0.02	92.1		1.8		18.9	0.4	13.3		0.3	
ELECTRIC CABLE		0.35	0		0		19.3	6.8	0		0	
SWITCH BOX		0.13		58.5		7.6	19.2	2.5	4.5		0.6	
LAMPS		0.08	0		0		19.3	1.5	0		0	
LIGHTOIL IN DRUMCAN		0.50		120.3		60.2	19.1	9.6	6.2		3.1	
TEL. BOX		0.05	83.1		4.2		19.5	1.0		15.7		0.8
PAINT LOCKER SHELF		0.25		76.9		19.2	19.3	4.8		9.0		2.3
TOOL, BOLT & NUT		0.05		65.7		3.3	19.1	1.0	2.5		0.1	
STOOL, SCRAP		0.01	106.7		1.1		19.3	0.2		2.3		0.0
AIR HOSE & TOOL		0.05	102.9		5.1		19.4	1.0		7.2		0.4
TOOL & ELECT. CABLE		0.06	97.5		3.9		19.1	0.8		14.7		0.6
SCRAP & DRAWING		0.02	95.2		1.9		19.1	0.4	3.0		0.1	
TEMPORARY MOORING LINES		1.28		122.5		156.8	19.8	25.3	0		0	
ROLLS PLASTIC & FIRE EXT.		0.03	96.7		2.9		19.1	0.6		2.5		0.1
SCRAP ANGLE		0.01	106.7		1.1		19.0	0.2	9.2		0.1	
IN STEERING GEAR ROOM :~												
ELECTRIC CABLE ETC.		0.15		120.3		18.0	14.5	2.2	1.5		0.2	
SUB TOTAL		4.33				90.6		87.7			0.3	

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (9/13)

ITEM	NO.	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.
ON 2ND DECK:~												
ELECT. CABLE		0.01	105.2		1.1		15.4	0.2		5.0		0.1
LADDER, OIL CAN & SCRAP		0.03	93.6		2.8		15.6	0.5		1.8		0.1
ON 3RD DECK:~												
HOSE, ELECT. CABLE, LAMP, FIRE EXT.		0.05	102.1		5.1		9.8	0.5	2.5		0.1	
SUB TOTAL		0.09			9.0			1.2				0.1

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (10/13)

ITEM	NO.	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.
IN HOLD:~												
(NO.1 HOLD)												
ELECT. CABLE & LAMP		0.05	79.0		4.0		11.5	0.6	0		0	
(NO.3 HOLD)												
ELECT. CABLE, HOSE, ETC.		0.03	19.2		0.6		10.0	0.3	8.5		0.3	
(NO.4 HOLD)												
ELECT. CABLE		0.04		11.2		0.4	10.0	0.4	3.5		0.1	
(NO.5 HOLD)												
ELECT. CABLE & ROPE		0.03		40.7		1.2	10.0	0.3	3.0		0.1	
UNDER DECK PASSAGE:~												
(PORT)												
ELECT. CABLE, LAMP, ROPE & FAN		0.05		22.7		1.1	16.3	0.8	13.8		0.7	
(STBD.)												
ELECT. CABLE		0.05		22.7		1.1	16.3	0.8		13.8		0.7
SUB TOTAL		0.25			0.8			3.2			0.5	

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (11/13)

ITEM	NO.	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.
IN ENGINE ROOM:~												
(ON FLOOR)												
SCRAP, HOSE, ETC.		0.04		68.9		2.8	4.3	0.2		4.5		0.2
L.O. CAN (2)		0.02		82.5		1.7	4.9	0.1		3.2		0.1
(ON 3RD DECK)												
TOOL BOX (2)		0.05		60.1		3.0	9.0	0.5		1.5		0.1
L.O. CAN (2)		0.02		59.3		1.2	9.0	0.2	0		0	
SCRAP, FIRE EXTINGUISHERS		0.02		66.5		1.3	9.1	0.2		6.2		0.1
(ON 2ND DECK)												
L.O. DRUM CAN (4)		0.62		72.1		44.7	12.0	7.4		5.0		3.1
TOOL BOX, SCRAP, DRAWING		0.10		66.5		6.7	12.0	1.2		8.2		0.8
SCAFFOLDING PLANK		0.02		68.9		1.4	11.6	0.2		5.3		0.1
OXYGEN BOTTLES		0.10		58.5		5.9	12.1	1.2	1.5		0.2	
ACETYLENE BOTTLES		0.10		62.5		6.3	12.1	1.2		4.4		0.4
(ON PARTIAL DECK)												
ROPE, SCRAP, ASH TRAY, ETC.		0.03		60.9		1.8	15.4	0.5		10.6		0.3
CHAIN BLOCK		0.02		83.3		1.7	16.5	0.3		3.5		0.1
SUB TOTAL		1.14				78.5		13.2				5.1

NOTE:- LCG : FROM MIDSHIP (⊠) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (12/13)

ITEM	NO.	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.
IN ENGINE ROOM :~												
SPARE PARTS OVER AND ABOVE THE RULE REQUIREMENT :~												
SPARE PARTS FOR MAIN ENGINE		0.72		67.7		48.7	14.7	10.6		1.4		1.0
SPARE PARTS FOR MAIN ENG. TURBO.		0.14		73.7		10.3	15.5	2.2		9.7		1.4
SPARE PARTS FOR D.GEN. & TURBO.		0.04		73.7		2.9	15.5	0.6		9.7		0.4
SPARE PARTS FOR AUX. BOILER		0.24		73.7		17.7	15.5	3.7		9.7		2.3
SPARE PARTS FOR EXH. GAS ECONOMIZER		5.50		83.7		460.4	24.2	133.1	8.0		44.0	
SPARE PARTS FOR SHAFTING & PROPELLER		0.58		85.7		49.7	4.7	2.7	5.4		3.1	
SPARE PARTS FOR MAIN GEN. TURBINE		0.06		73.7		4.4	15.5	0.9		9.7		0.6
SPARE PARTS FOR AUX. MACHINERY		1.56		73.7		115.0	15.5	24.2		9.7		15.1
TOOLS FOR MAIN ENGINE		7.57		66.9		506.4	12.0	90.8		2.5		18.9
SPARE PARTS FOR OTHER MACHINERY		1.37		67.1		91.9	15.9	21.8	2.4		3.3	
SUB TOTAL		17.78				1307.4		290.6			10.7	

NOTE:- LCG : FROM MIDSHIP (⊠) TCG : FROM SHIP'S CENTER LINE VCG : ABOVE BASE LINE

WEIGHT TO BE TAKEN OUT (13/13)

ITEM	NO.	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.
IN SHAFT TUNNEL:~												
CHAIN BLOCK, HOSE, SCRAP		0.02		92.5		1.9	6.0	0.1	0		0	
TOOL, STOOL		0.03		88.8		2.7	4.4	0.1	2.5		0.1	
ALL AROUND THE SHIP:-												
VYNIL COVER		0.35	0		0		12.0	4.2	0		0	
MEN ON BOARD (5P.)		0.35	0		0		19.4	6.8	0		0	
SUB TOTAL		0.75				4.6		11.2			0.1	
MISCELLANEOUS TOTAL		24.95				1410.1		424.8			4.6	

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

WEIGHT TO BE ADDED (1/4)

ITEM	LIQUID LEVEL (M)	DENSITY (MT/M³)	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.	FREE SURFACE (MT-M)
WATER & OIL IN ENGINE ROOM:~														
STERN TUBE L.O. HEAD T.	FULL	0.900	0.24		86.1		20	16.0	4	0.8		0		0
STERN TUBE L.O. FWD. SEAL O.T.	FULL	0.900	0.05		106.6		5	6.1	0	0		0		0
DEARATION CHAMBER (F.O.)	FULL	0.980	0.20		78.9		16	20.0	4	9.6		2		0
F.O. MIXING CHAMBER	FULL	0.980	0.20		67.3		13	15.8	3		5.2		1	0
COOLING F.W. DEARATION T.	FULL	1.000	0.16		84.1		13	16.2	3	2.3		0		0
MAIN L.O. COOLERS (2) (L.O.)	FULL	0.900	1.05		67.3		71	5.0	5	10.5		11		0
Do. (F.W.)	FULL	1.000	1.17		67.3		79	5.0	6	10.5		12		0
STERN TUBE L.O. COOLER (L.O.)	FULL	0.900	0.03		102.6		3	5.3	0	1.2		0		0
Do. (F.W.)	FULL	1.000	0.01		102.6		1	5.3	0	1.2		0		0
CAMSHAFT L.O. COOLER (L.O.)	FULL	0.900	0.11		80.9		9	5.2	1		7.2		1	0
Do. (F.W.)	FULL	1.000	0.04		80.9		3	5.2	0		7.2		0	0
CENTRAL F.W. COOLERS (2) (F.W.)	FULL	1.000	1.03		67.3		69	9.0	9	10.0		10		0
Do. (S.W.)	FULL	1.025	1.07		67.3		72	9.0	10	10.0		11		0
AUX. CONDENSER (DRAIN)	FULL	1.0	3.40		73.7		251	6.6	22	11.1		38		0
Do. (S.W.)	FULL	1.025	1.64		73.7		121	6.4	10	11.1		18		0
AUX. BOILER (F.W.)	N.W.L.	1.000	8.70		81.7		711	10.3	90	10.2		89		0
EXH. GAS ECONOMIZER (F.W.)	N.W.L.	1.000	7.35		81.7		600	24.0	176	8.0		59		0
FLASHER (F.W.)	N.W.L.	1.000	1.70		80.9		138	24.0	41	12.2		21		0
SUB TOTAL			28.15				2195		384			269		0

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG : ABOVE BASE LINE

1213

WEIGHT TO BE ADDED (2/4)

ITEM	LIQUID LEVEL (M)	DENSITY (MT/M³)	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.	FREE SURFACE (MT-M)
WATER & OIL IN ENGINE ROOM :~														
MAIN ENGINE (L.O.)	FULL	0.900	5.99		73.7		441	6.5	39	0		0		0
DO. (F.O.)	FULL	0.980	0.18		73.7		13	6.5	1	0		0		0
DO. (F.W.)	FULL	1.000	15.69		73.7		1156	6.5	102	0		0		0
NO. 1 GEN. DIESEL ENG. (L.O.)	FULL	0.900	1.18		68.9		81	13.0	15	8.0		9		0
DO. (F.W.)	FULL	1.000	0.34		68.9		23	13.0	4	8.0		3		0
NO. 2 GEN. DIESEL ENG. (L.O.)	FULL	0.900	1.18		68.9		81	13.0	15	11.3		13		0
DO. (F.W.)	FULL	1.000	0.34		68.9		23	13.0	4	11.3		4		0
NO. 3 GEN. DIESEL ENG. (L.O.)	FULL	0.900	1.18		73.7		87	13.0	15	8.0		9		0
DO. (F.W.)	FULL	1.000	0.34		73.7		25	13.0	4	8.0		3		0
PIPING (L.O.)	FULL	0.900	7.61		72.1		549	7.0	53	2.0		15		0
DO. (F.O.)	FULL	0.980	10.70		61.7		660	8.0	86		4.0		43	0
DO. (F.W.)	FULL	1.000	9.37		75.3		706	10.0	94	7.5		70		0
DO. (S.W.)	FULL	1.025	27.14		64.5		1751	4.5	122	3.0		81		0
COOLING WATER T.	FULL	1.000	90.10		109.65		9861	4.60	414	0		0		0
BOTTOM L.O. SUMP T.	(27.1 M³)	0.900	24.39		72.55		1769	1.03	25	0		0		33
SUB TOTAL			195.73				17226		993			164		33
WATER & OIL TOTAL			223.88				19421		1377			433		33

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

WEIGHT TO BE ADDED (3/4)

ITEM	NO.	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.
PAINT (BOTTOM & SIDE SHELL)		3.66		8.0		27.7	0.6	2.1	0		0	
" (TOP SIDE SHELL)		0.88		2.5		2.2	15.8	13.9	0		0	
" (DECK)		0.86	0		0		18.9	15.9	0		0	
" (HOUSE EXT.)		0.72	99.8		71.9		30.1	21.7	0		0	
" (HOUSE INT.)		0.42	99.8		41.9		18.2	7.6	0		0	
" (HOLD)		0.67		3.0		2.0	5.1	3.4	0		0	
" (UNDER DECK PASSAGE)		0.96		3.5		3.4	16.7	16.0	0		0	
" (ENGINE ROOM)		1.02		70.5		71.9	3.5	3.6	0		0	
" (FITTINGS)		0.90		4.0		3.6	20.0	18.0	0		0	
RUBBER MAT (NAV. BR. DK.)		0.80	104.4		83.5		35.6	28.5	0		0	
" " (SWIM POOL SIDE)		0.16	105.2		16.8		18.9	3.0	0		0	
CARPET (SR. OFFICER DK.)		0.24	101.3		24.3		32.8	7.9	0		0	
" (PASSENGER DK.)		0.32	101.3		32.4		30.1	9.6	0		0	
" (BOAT DK.)		0.24	101.3		24.3		27.4	6.6	0		0	
" (CREW DK.)		0.24	101.3		24.3		24.7	5.9	0		0	
" (SALOON DK.)		0.16	101.3		16.2		22.0	3.5	0		0	
" (UPPER DK.)		0.08	97.5		7.8		18.9	1.5	0		0	
MOORING ROPES		6.09		3.5		21.3	21.7	132.2	0		0	
WELDING		0.10	0		0		18.9	1.9	0		0	
INVENTORY		1.00		6.5		6.5	17.5	17.5	0		0	
LINEN, DISH, CUP TRAY		3.00	100.6		301.8		30.1	90.3	0		0	
NON SLIP COATING FOR HATCH COVER		0.48		1.5		0.7	20.8	10.0	0		0	
SUB TOTAL		22.78			505.9			420.6			0	

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

WEIGHT TO BE ADDED (4/4)

ITEM	NO.	WEIGHT (MT)	LCG (M) FORE	LCG (M) AFT	LCG MOMENT (MT-M) FORE	LCG MOMENT (MT-M) AFT	VCG (M)	VCG MOMENT (MT-M)	TCG (M) PORT	TCG (M) STBD.	TCG MOMENT (MT-M) PORT	TCG MOMENT (MT-M) STBD.
AIR PIPE HEAD		0.01		80.9		0.8	19.1	0.2	15.8		0.2	
ENG. CONTROL RM. FLOORING		0.20		72.1		14.4	11.8	2.4		9.5		1.9
ENG. CONFERENCE RM. FLOORING		0.06		81.7		4.9	18.9	1.1		7.6		0.5
WASH MACH. & DRYER (CREW DK.)		0.20	99.0		19.8		25.7	5.1	11.0		2.2	
" " " " (PASS. DK.)		0.20	99.0		19.8		31.1	6.2	7.2		1.4	
" " " " (SR. OFF. DK.)		0.20	99.0		19.8		33.8	6.8	4.0		0.8	
GYM. EQUIPMENTS		0.50	104.4		52.2		19.5	9.8		3.8		1.9
PAINT LOCKER SHELF		0.25		80.9		20.2	19.8	5.0		11.4		2.9
BOX FOR REF. CONT. MONITORING CABLE (INCL. CABLE)		0.15		55.3		8.3	17.8	2.7	4.5		0.7	
SUB TOTAL		1.77			63.0			39.9				1.9
MISCELLANEOUS TOTAL		24.55			568.9			459.9				1.9

NOTE:- LCG : FROM MIDSHIP (M) TCG : FROM SHIP'S CENTER LINE VCG: ABOVE BASE LINE

TREASURY DEPARTMENT
U.S. COAST GUARD
CG-993-12 (Rev. 12-59)

STABILITY TEST MV "TILLIE LYKES" Page 23 of 26

DRAFTS CORRECTED TO "CURVES OF FORM" PERPENDICULARS FOR USE IN CALCULATIONS ;

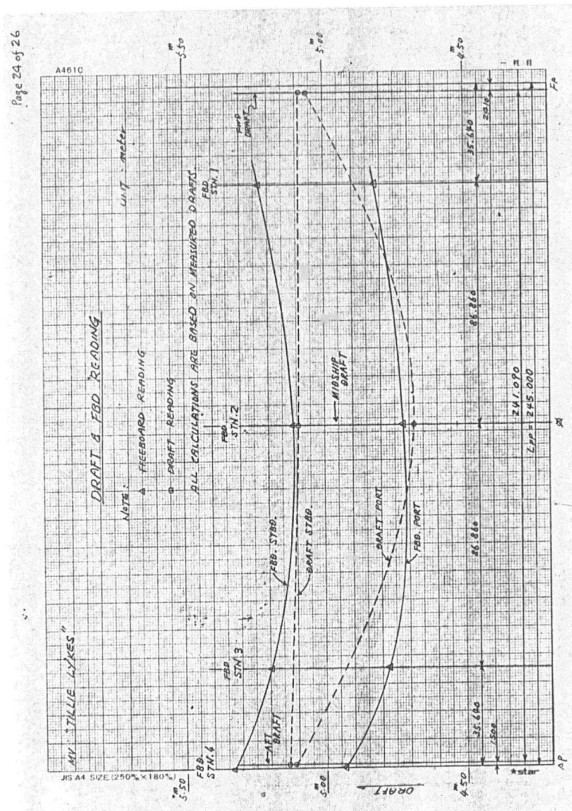
TRIM BETWEEN FORWARD AND AFT DRAFT MARKS 16 FEET 9.625 INCH − 16 FEET 7.750 INCHES = 1.875 INCHES (0.0476 M)

DISTANCE BETWEEN FORWARD AND AFT DRAFT MARKS 245.00 − (2.41 + 1.50) = 241.090 M

FORWARD DRAFT CORRECTED 16 FEET 7.750 INCH − $2.41 \times \frac{0.0476}{241.090}$ = 16 FEET 7.731 INCH = 16.644 FEET
(0.0005 M (0.019 INCH))

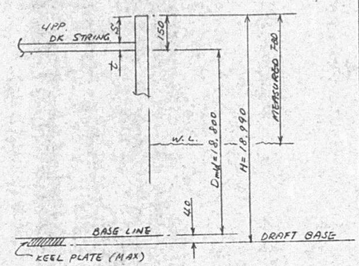
AFT DRAFT CORRECTED 16 FEET 9.625 INCHES + $1.50 \times \frac{0.0476}{241.090}$ = 16 FEET 9.637 INCHES = 16.803 FEET
(0.0003 M (0.012 INCH))

1215



MV "TILLIE LYKES"

FREEBOARD MEASUREMENT



STN.	4		3		2		1	
	P	S	P	S	P	S	P	S
S (mm)	160	160	129	128	106	108	119	119
t (mm)	10	10	22	22	42	42	30	30
*H (m)	18.99	18.99	18.99	18.99	18.99	18.99	18.99	18.99
MEASURED FBD (m)	14.056	13.660	14.215	13.795	14.270	13.880	14.170	13.755
DRAFT (m)	4.936	5.330	4.775	5.195	4.720	5.110	4.820	5.235

NOTE: DRAFT = H - MEASURED FBD.

FREEBOARDS WERE MEASURED FROM TOP OF SHELL TO WATER LEVEL DIRECTLY BY MEASURING STEEL TAPE.

* DESIGNED FIGURE

CERTIFICATE OF DRAFT MARKS

This is to certify that the draft marks forward, midship and aft on both port and starboard side of the M.V. TILLIE LYKES were correctly positioned based on the results of keel sight and verified as considered necessary by the undersigned.

6th October 1986

I. WAKU
American Bureau of Shipping

W. D. McCoss.
Lykes Bros. Steamship co., Inc.

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL								

APPROVAL OF OWNER & REGULATORY BODIES

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. **1325** — SHIP'S NAME **TILLIE LYKES**

CO-ORDINATION SECTION

APL MODIFICATION

LONGITUDINAL STRENGTH CALCULATION

DATE (TEL)

JOB NO. TS1323/24/25 — SCALE — LYKES REF. NO. **290702** — MITSUI DRAWING NO. **1102103M**

JOBCLASSIF. NO.

(11 SHEETS WITH COVER)

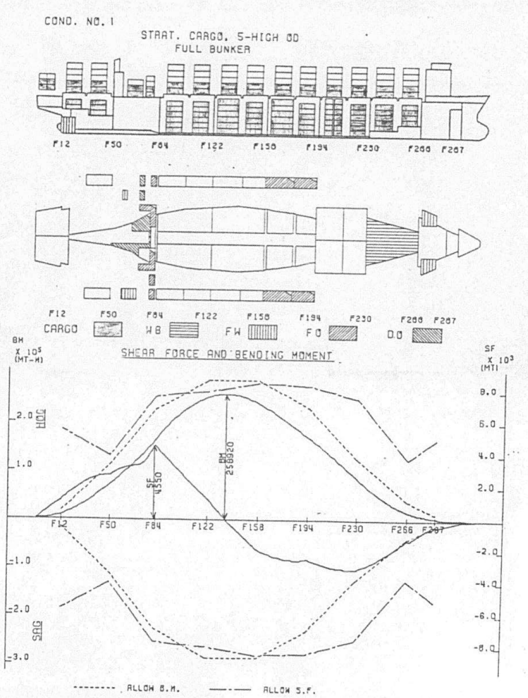
PLAN RECORD

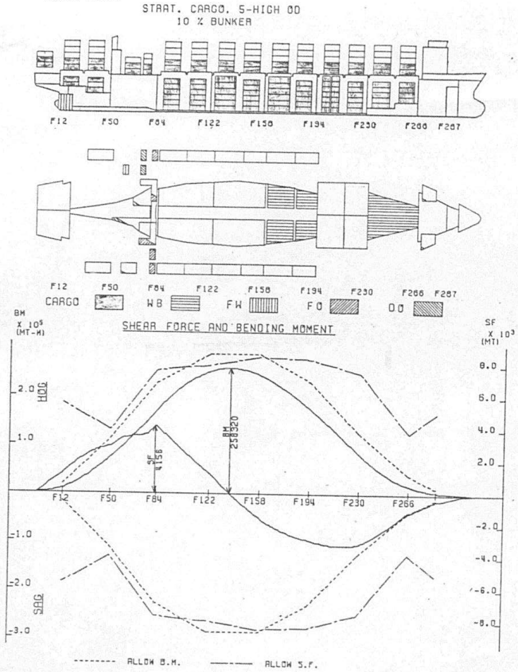
ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. NO. 1323 AS FINISHED PLAN, APPLIED TO S. NO. 1325 "TILLIE LYKES" DUE TO SIMILARITY IN DESIGNING, OUTFITTING AND LIGHTSHIP WEIGHT.	NOV. 10, 1986 K.A.
		ADDED APL'S LOADING CONDITIONS FOR APL-MODIFICATION.	MAR. 3, 1987 K.A.

SUMMARY OF LONGITUDINAL STRENGTH CALCULATION
(BY SOPHISTICATED COMPUTER PROGRAM)

SHEAR FORCE = (MT)
BENDING MOMENT = (MT-M)

COND. NO.		MAXIMUM POSITION	MAXIMUM VALUE	BULKHEAD (FR. NO.) 12	50	84	122	158	194	230	266	287
1	SF	83.0	4550	1185	2717	4511	1249	-1898	-2452	-3069	-1246	-402
	BM	134.8	258920	9047	71694	164350	252460	240063	170722	85226	17683	4190
2	SF	83.0	4156	1185	2885	4127	1258	-1512	-2859	-3137	-1103	-420
	BM	136.6	258320	9046	73216	168633	250950	244404	175598	83307	17279	4287
MAXIMUM ALLOWABLE	SF			5580	3920	7630	7950	8640	8340	7520	3750	5050
	BM			16600	111500	226800	287500	287500	231200	125000	39300	11600





TS-1

DEPARTURE CALCULATION

Voyage______ Departure Port______ Arrival Port______ Date______

	Weight Tonnes	L.Moment Fwd (MT)	L.Moment Aft (MT)	VCG (M)	V.Moment (MT)	F.S. Moment (MT)
Operating Lightship	17472	------	250244	-----	213418	62
Containers -Sheet TS-2	14982	294581	388223	-	255298	-
Fuel Oil -Sheet TS-3	3279	35186	79406	-	28845	1459
Diesel Oil -Sheet TS-3	200	-	13555	-	838	368
Fresh Water-Sheet TS-3	375	22512	10593	-	6142	457
Salt Water -Sheet TS-4	1565	119119	-	-	6136	-
Misc. Tanks-Sheet TS-4	-	-	-	-	-	-
1. Totals	37873 a	471398 b	742021 c	13.48 d	510677 e	2346 f

DRAFT AND TRIM CALCULATION		STABILITY CALCULATION	
2. Even Keel Draft (Hydrostatics)	8.13	18. Change in KM (Hydrostatics) $0.089 \times \frac{0.41}{2.0}$	0.02
3. L.Mom. for Trim (1c) - (1b) If (-) then F, if (+) then A	270623 ~~F~~ A		
4. LCG (3) ÷ (1a)	7.15 ~~F~~ A	19. KM at Even Keel Draft (Hydrostatics)	15.82
5. LCB (Hydrostatics)	6.39 ~~F~~ A	20. KM Corrected If (9) is (F) then (19)-(18) If (9) is (A) then (19)+(18)	15.84
6. Trim Lever (4) - (5) If (-) the F, if (+) then A	0.76 ~~F~~ A	21. KG (1d) = (1e) ÷ (1a)	13.48
7. Trim Moment (1a) x (6)	28783	22. GM Uncorrected (20) - (21)	2.36
8. Moment to Trim One Meter (Hydrostatics)	69692	23. F.S. Correction (1f) ÷ (1a)	0.06
9. Trim in Meters (7) ÷ (8)	0.41 ~~F~~ A	24. GM Corrected (22) - (23)	2.30
		25. GM Required	0.90

DRAFT AND TRIM CALCULATION		Observed	Port	Stbd	Average
10. Change in Draft Fwd per Meter of Trim (Hydrostatics)	0.52	Draft Fwd			
11. Draft Change Fwd (9) x (10)	0.21				
12. Draft At Fwd Marks If (9) is (F) then (2) + (11) If (9) is (A) then (2) - (11)	7.92				
13. Change in Draft Aft per Meter of Trim (Hydrostatics)	0.47	Draft Aft			
14. Draft Change Aft (9) x (13)	0.19				
15. Draft at Aft Marks If (9) is (F) then (2) - (14) If (9) is (A) then (2) + (14)	8.32	Midship			
16. Mean Draft [(12) + (15)] ÷ 2	8.12	Trim			

TS-2F

CONTAINER STOWAGE SUMMARY
FOR CONTAINER ROWS FWD OF AMIDSHIP

Voyage______ Departure Port______ Arrival Port______ Date______

Row	No. Containers 20's	40's	45's	Weight* Tonnes	V.Moment* (MT)	LCG M - ⊠	Fwd L.Moment (MT)
1 Above Dk	----	65	----	442	11176	84.95 F	37548 F
	----	----				84.95 F	F
1 Below Dk	----	14	----	210	2876	84.95 F	17840 F
2 Above Dk	10	----	----	46	1152	74.19 F	3413 F
	----	55	----	374	9456	70.36 F	26315 F
	----	----				70.36 F	F
2 Below Dk	----	30	----	450	5796	71.12 F	32004 F
3 Above Dk	10	----	----	46	1152	66.53 F	3060 F
4 Above Dk	----	65	----	442	11176	55.43 F	24500 F
	----	----				55.43 F	F
4 Below Dk	----	40	----	600	7115	55.43 F	33258 F
5 Above Dk	10	----	----	46	1152	44.67 F	2055 F
	----	55	----	374	9456	40.84 F	15274 F
	----	----				40.84 F	F
5 Below Dk	60	----	----	600	7186	44.67 F	26802 F
6 Above Dk	10	----	----	46	1152	37.01 F	1702 F
6 Below Dk	60	----	----	600	7186	37.01 F	22206 F
7 Above Dk	----	65	----	442	11176	25.91 F	11452 F
	----	----				25.91 F	F
7 Below Dk	----	54	----	810	8646	25.91 F	20987 F
8 Above Dk	----	65	----	442	11176	11.32 F	5003 F
	----	----				11.32 F	F
8 Below Dk	----	----	58	986	10580	11.32 F	11162 F
TOTALS FWD	160	508	58	6956	117609		294581 F

* Weight and vertical moment of each row are summed on the Container Stowage Sheets.

LCG's for container stacks aft of amidships are listed on the following page.

TS-2A

CONTAINER STOWAGE SUMMARY
FOR CONTAINER ROWS AFT OF AMIDSHIP

Voyage______ Departure Port______ Arrival Port______ Date______

Row	No. Containers 20's	40's	45's	Weight* Tonnes	V.Moment* (MT)	LCG M - ⊠	Aft L.Moment (MT)
9 Above Dk	----	65	----	442	11176	3.61 A	1596 A
	----	----				3.61 A	A
9 Below Dk	----	60	----	900	9010	3.61 A	3249 A
10 Above Dk	----	65	----	442	11176	18.20 A	8044 A
	----	----				18.20 A	A
10 Below Dk	----	----	60	1020	10690	18.20 A	18564 A
11 Above Dk	----	65	----	442	11176	33.12 A	14639 A
	----	----				33.12 A	A
11 Below Dk	----	60	----	900	9010	33.12 A	29808 A
12 Above Dk	----	65	----	442	11176	48.67 A	21512 A
	----	----				48.67 A	A
12 Below Dk	----	58	----	870	8915	48.67 A	42343 A
13 Above Dk	46	----	----	232	5229	62.54 A	14509 A
14 Above Dk	----	34	----	306	6758	72.23 A	22102 A
15 Above Dk	----	65	----	442	11176	92.88 A	41053 A
	----	----				92.88 A	A
15 Below Dk	----	28	----	420	5819	92.88 A	39010 A
16 Above Dk	----	65	----	442	11176	107.13 A	47351 A
	----	----				107.13 A	A
16 Below Dk	----	18	----	270	4058	107.13 A	28925 A
17 Above Dk	36	----	----	228	5572	118.37 A	26988 A
	----		----			121.75 A	A
18 Above Dk	36	----	----	228	5572	125.13 A	28530 A
TOTALS AFT	118	648	60	8026	137689		388223 A
TOTALS FWD	160	508	58	6956	117609		294581 F
TOTALS	278	1156	118	14982	255298		

* Weight and vertical moment of each row are summed on the Container Stowage Sheets.

Enter "TOTALS FWD" from the previous sheet.

TS-3

TANK CAPACITIES - FUEL OIL, DIESEL OIL, FRESH WATER Date____________

FUEL OIL (Specific Gravity = 0.9845)

TANK	Weight - Tonnes 98%	Weight - Tonnes Actual	LCG (M)	L.Moment Actual	L.Moment 98%	VCG* (M)	V.Moment Actual	V.Moment 98%	Free Surface 98%	Free Surface Slack	Free Surface Actual
NO.3 F.W. F.O.T. P	450.3	450.3	25.76F	11600 F	11,600F	8.57	3859	3,859	22	37	22
NO.3 F.W. F.O.T. S	450.3	450.3	25.76F	11600 F	11,600F	8.57	3859	3,859	22	37	22
NO.3 A.W. F.O.T. P	547.8	547.8	10.94F	5993 F	5,993F	8.78	4810	4,810	27	27	27
NO.3 A.W. F.O.T. S	547.8	547.8	10.94F	5993 F	5,993F	8.78	4810	4,810	27	27	27
Total L.Moment Fwd				35186 F	35,186F						
DEEP F.O.T. P	461.6	461.6	62.01A	28624 A	28,624A	7.88	3637	3,637	5	550	550
DEEP F.O.T. S	469.1	469.1	62.83A	29474 A	29,474A	8.26	3875	3,875	11	552	552
H.F.O. SETT. T. P	116.4	116.4	60.57A	7050 A	7,050A	10.40	1211	1,211	157	157	157
H.F.O. SETT. T. S	115.6	115.6	60.53A	6997 A	6,997A	11.52	1332	1,332	81	81	81
H.F.O. SERV. T.	119.8	119.8	60.61A	7261 A	7,261A	12.12	1452	1,452	21	26	21
Total L.Moment Aft				79406 A	79,406A						
TOTALS	3,279	3279					28845	28,845	373	1,494	1459

DIESEL OIL (Specific Gravity = 0.870)

TANK	Weight - Tonnes 98%	Weight - Tonnes Actual	LCG (M)	L.Moment Actual	L.Moment 98%	VCG (M)	V.Moment Actual	V.Moment 98%	Free Surface 98%	Free Surface Slack	Free Surface Actual
DIESEL OIL T. P	73.9	73.9	66.28A	4898 A	4,898A	1.56	115	115	238	267	267
DIESEL OIL T. S	86.1	86.1	69.36A	5972 A	5,972A	1.52	131	131	86	93	93
D.O. SETT. T.	20.1	20.1	67.30A	1353 A	1,353A	13.06	263	263	4	4	4
D.O. SERV. T.	19.8	19.8	67.28A	1332 A	1,332A	16.62	329	329	4	4	4
TOTALS	200	200		13555 A	13,555A		838	838	332	368	368

FRESH WATER (Specific Gravity = 1.000)

TANK	Weight - Tonnes 100%	Weight - Tonnes Actual	LCG (M)	L.Moment Actual	L.Moment 100%	VCG (M)	V.Moment Actual	V.Moment 100%	Free Surface Slack	Free Surface Apply
NO.1 POT. W.T. P	116.5	116.5	96.62F	11256 F	11,256F	17.44	2032	2,032	219	219
NO.1 POT. W.T. S	116.5	116.5	96.62F	11256 F	11,256F	17.44	2032	2,032	219	219
Total L.Moment Fwd				22512 F	22,512F					
NO.2 POT. W.T.	111.4	111.4	73.09A	8142 A	8,142A	14.95	1665	1,665	14	14
DIST. W.T.	30.6	30.6	80.10A	2451 A	2,451A	13.51	413	413	5	5
Total L.Moment Aft				10593 A	10,593A					
TOTALS	375	375					6142	6,142	457	457

* Use Tank VCG Tables on page 13. Determine the VCG by rounding off the weight to the next highest 100 tonnes. Interpolation is not necessary.

TS-4

SALT WATER BALLAST, MISCELLANEOUS TANKS Date____________

SALT WATER BALLAST (Specific Gravity = 1.025)

TANK	Weight - Tonnes 100%	Weight - Tonnes Actual	LCG (M)	L.Moment Actual	L.Moment 100%	VCG* (M)	V.Moment Actual	V.Moment 100%	Free Surface Slack	Free Surface Apply
DEEP W.B.T.	380.7	0	110.28F	0 F	41,984F		0	3,514	371	0
NO.1 BTM. W.B.T.	1,565.3	1565.3	76.10F	119119 F	119,119F	3.92	6136	6,136	9,422	
NO.2 F. W.B.T. P	565.8	0	55.07F	0 F	31,159F		0	4,028	287	
NO.2 F. W.B.T. S	565.8		55.07F	F	31,159F			4,028	287	
NO.2 A. W.B.T. P	789.1		40.20F	F	31,722F			5,232	1,131	
NO.2 A. W.B.T. S	790.0		40.24F	F	31,790F			5,238	1,138	
NO.3 BTM. W.B.T. P	412.7		16.74F	F	6,909F	0.98		404	2,503	
NO.3 BTM. W.B.T. S	412.7		16.74F	F	6,909F	0.98		404	2,503	
Total L.Moment Fwd				119119 F	300,751F					
NO.4 F.W. W.B.T. P	480.8	0	3.83A	0 A	1,837A		0	4,140	23	0
NO.4 F.W. W.B.T. S	480.8		3.83A	A	1,837A			4,140	23	
NO.4 BTM. W.B.T. P	623.6		12.19A	A	7,602A	0.92		574	4,995	
NO.4 BTM. W.B.T. S	623.6		12.19A	A	7,602A	0.92		574	4,995	
NO.4 A.W. W.B.T. P	605.6		18.56A	A	11,240A			5,184	28	
NO.4 A.W. W.B.T. S	605.6		18.56A	A	11,240A			5,184	28	
NO.5 BTM. W.B.T. P	531.7		40.47A	A	21,518A	0.96		510	3,932	
NO.5 BTM. W.B.T. S	531.7		40.47A	A	21,518A	0.96		510	3,932	
NO.5 WING W.B.T. P	566.6		34.50A	A	19,548A			4,901	27	
NO.5 WING W.B.T. S	566.6		34.50A	A	19,548A			4,901	27	
NO.6 WING W.B.T. P	580.2		91.13A	A	52,874A			5,843	828	
NO.6 WING W.B.T. S	580.2		91.13A	A	52,874A			5,843	828	
AFT PEAK T. P	453.4		118.16A	A	53,574A			5,495	2,982	
AFT PEAK T. S	462.0		118.29A	A	54,650A			5,604	3,115	
ANTI-HEELING T. P	615.9		49.83A	A	30,690A			5,007	158	
ANTI-HEELING T. S	615.9		49.83A	A	30,690A			5,007	158	
Total L.Moment Aft				0 A	398,842A					
TOTALS	14,406	1565					6136	92,401	43,721	0

MISCELLANEOUS TANKS (Specific Gravity = 1.000)

TANK	Weight - Tonnes 100%	Weight - Tonnes Actual	LCG (M)	L.Moment Actual	L.Moment 100%	VCG (M)	V.Moment Actual	V.Moment 100%	Free Surface Slack	Free Surface Apply
SOOT CLEAN WATER T.	40.9	0	78.41A	0 A	3,207A	9.57	0	391	9	0
CLEAN DRAIN T.	17.8		78.14A	A	1,391A	1.68		30	6	
WASTE OIL T.	17.8		65.60A	A	1,168A	2.01		36	36	
BILGE T.	62.4		87.13A	A	5,437A	1.41		88	153	
TOTALS	139	0		0 A	11,203A		0	545	204	0

* Use Tank VCG Tables on page 13. Determine the VCG by rounding off the weight to the next highest 100 tonnes. Interpolation is not necessary.

TS-6

ARRIVAL CALCULATION

Voyage__________ Departure Port__________ Arrival Port__________ Date__________

Item	Weight Tonnes	L.Moment Fwd (MT)	L.Moment Aft (MT)	VCG (M)	V.Moment (MT)	F.S.M. (MT)
Departure Condition	37873	471398	742021	13.48	510677	2346
±Weight Changes since departure:						
FO Tank No.3 F.W. P	-450	-11600			-3859	-22
FO Tank No.3 F.W. S	-450	-11600			-3859	-22
FO Tank No.3 A.W. P	-548	-5993			-4810	-27
FO Tank No.3 A.W. S	-548	-5993			-4810	-27
FO Tank DEEP P	-316		-19596	7.88	-2490	–
FO Tank DEEP S	-323		-20294	8.26	-2668	–
DO Tank P	-66		-4374	1.56	-103	–
DO Tank S	-78		-5410	1.52	-119	–
DO Tank						
SW Tank No.3 BTM. P	+413	+6909			+404	0
SW Tank No.3 BTM. S	+413	+6909			+404	0
SW Tank						
FW Tank No.1 P.W. P	-105	-10145		17.44	-1831	-
FW Tank No.1 P.W. S	-105	-10145		17.44	-1831	-
FW Tank No.2 P.W.	-100		-7309	14.95	-1495	-
1. Total at Arrival	35610 a	429740 b	685038 c	13.58 d	483610 e	2248 f

Item	Value	Item	Value
2. Even Keel Draft (Hydrostatics)	7.75	18. Change in KM $0.110 \times \frac{0.43}{2.0}$ (Hydrostatics)	0.02
3. L.Mom. for Trim (1c) - (1b) If (-) then F, if (+) then A	255298 F/A		
4. LCG (3) ÷ (1a)	7.17	19. KM at Even Keel Draft (Hydrostatics)	16.03
5. LCB (Hydrostatics)	6.37 F/A		
6. Trim Lever (4) - (5) If (-) then F, if (+) then A	0.80 F/A	20. KM Corrected If (9) is (F) then (19) - (18) If (9) is (A) then (19) + (18)	16.05
7. Trim Moment (1a) x (6)	28488 F/A		
8. Moment to Trim one Meter (Hydrostatics)	66769		
9. Trim in Meters (7) ÷ (8)	0.43 F/A	21. KG (1d) = (1e) ÷ (1a)	13.58
10. Change in Draft Fwd per Meter of Trim (Hydrostatics)	0.52	22. GM uncorrected (20) - (21)	2.47
		23. F.S. Correction (1f) ÷ (1a)	0.06
11. Draft Change Fwd (9) x (10)	0.22	24 GM Corrected (22) - (23)	2.41
12. Draft at Fwd Marks If (9) is (F) then (2) + (11) If (9) is (A) then (2) - (11)	7.53	25. GM Required	1.00
13. Change in Draft Aft per Meter of Trim (Hydrostatics)	0.47		
14. Draft Change Aft (9) x (13)	0.20		
15. Draft at Aft Marks If (9) is (F) then (2) - (14) If (9) is (A) then (2) + (14)	7.95		
16. Mean Draft [(12) + (15)] ÷ 2	7.74		

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	3th/APR/85	OFTS/MES-266			8th/MAY/85	T-8-2		

APPROVAL OF OWNER & REGULATORY BODIES

ABS(S.L.O) 7
O. F. 2
OWNER(TAMA) 1
OWNER(S.L.O) 2
MHI (F.O) 1

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER | SHIP'S NO. | SHIP'S NAME

OUTFITTING DESIGN SECTION
SEC.CHIEF S. Nishiura
ASSIST.CHIEF M. Ishii
CHARGE ENG'R
STAFF J. Morimoto
DATE (TEL 2235)

軸系横振動計算書
CALCULATION OF LATERAL VIBRATION

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25		290703	5124102

JOBCLASSIF. NO. E-04-01

(7 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	July/17/86 J. M

DWG.NO. 5124102 (1)

1. Paticuras of main engine and propeller

(1) Main engine

Type ------------------- Mitsui B & W 9L80MCE

Output ------------------- 28800 PS (at M.C.O.)

Revolution --------------- 83 RPM (at M.C.O.)

(2) Propeller

Diameter ----------------- 8100 MM

No of blade -------------- 5

Weight ------------------- 41T750 KG

Polar mass moment of inertia in air -------- 120230 kg·M²

2. Calculation of lateral vibration

(1) Critical speeds of lateral vibration is calculated by transfer matrix method.

(2) Input data for computer program are shown in fig.1.

(3) Critical speed is calculated under the condition that the stiffness of aft stern tube bearing and fore stern tube bearing are 37 TON/mm & 45 TON/mm respectively.

3. Critical speed

Critical speeds are shown in table 1.

Table 1

Bearing stiffness	Critical speed (R.P.M.) Forward	Critical speed (R.P.M.) Backward
(AFT / FORE) 37 TON/mm / 45 TON/mm	102.1	95.3

(This table shows only propeller blade order)

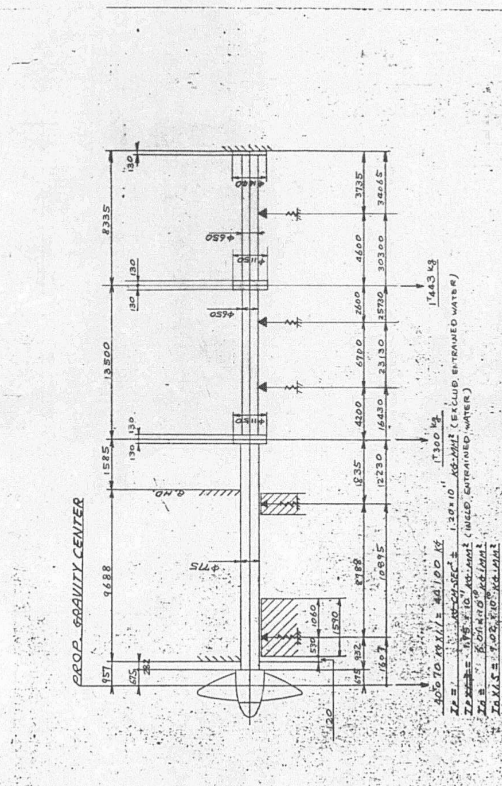


FIG. 1 S.NO. 1323/4/5 CALCULATION DATA OF LATERAL VIBRATION

******CALCULATION OF SHAFTING LATERAL VIBRATION ******

MAR.06.1985

CALCULATION OF LATERAL VIBRATION

ENGINE TYPE 9L80MCE
ENGINE NO.
SHIP NO. 1323

***** CALCULATION CONTROL DATA *****

NUMBER OF SPANS NSPAN = 8
NUMBER OF BEARINGS NBRNG = 5
LEFT END CONDITION MML =FREE
RIGHT END CONDITION MMR = 3

MMR = 0 --- FREE
1 --- BEARING
2 --- ROLL
3 --- FIXED

SHAFT SPEED REV = 83,000(RPM)
FIRST CALCULATION SPEED FRQS = 100,000(CPM)
LAST CALCULATION SPEED FRQE = 600,000(CPM)
PITCH PICH = 50,000(CPM)

***** PROPELLER DATA *****

DIAMETER = 8100,000 (MM)
NUMBER OF BLADES = 5
MASS = 44100,000 (KG)

MOMENT OF INERTIA AROUND THE POLE = 0,17500E+12 (KG*MM2)
MOMENT OF INERTIA AROUND THE DIA. = 0,90200E+11 (KG*MM2)

***** SPAN DATA *****

SPAN NO. *	SHAPE *	END COND. *	NUMBER OF SEC. *	SEC. LENGTH (MM)	DENSITY (KG/MM3)	YOUNG'S MODULUS (N/MM2)	INNER DIA. (MM)	OUTER DIA. (MM) LEFT	RIGHT	SPRING (N/MM) HORIZONTAL	VERTICAL	ADD. MASS (KG)
1)	0	1	4	401,75	0,785E-05	0,206E+06	0,0	775,00	0,0	0,370E+06	0,370E+06	0,0
2)	0	1	16	549,25	0,785E-05	0,206E+06	0,0	775,00	0,0	0,450E+06	0,450E+06	0,0
3)	0	0	4	458,75	0,785E-05	0,206E+06	0,0	775,00	0,0	0,0	0,0	1300,00
4)	0	1	10	420,00	0,785E-05	0,206E+06	0,0	650,00	0,0	0,100E+07	0,100E+07	0,0
5)	0	1	10	670,00	0,785E-05	0,206E+06	0,0	650,00	0,0	0,100E+07	0,100E+07	0,0
6)	0	0	5	520,00	0,785E-05	0,206E+06	0,0	650,00	0,0	0,0	0,0	1443,00
7)	0	1	10	457,00	0,785E-05	0,206E+06	0,0	650,00	0,0	0,100E+07	0,100E+07	0,0
8)	0	3	8	470,62	0,785E-05	0,206E+06	0,0	650,00	0,0	0,0	0,0	0,0

/NOTE/ SHAPE = 0 --- NO GYRO EFFECT OF SHAFT
1 --- GYRO EFFECT OF SHAFT
2 --- NO GYRO EFFECT OF SHAFT (TAPER)
3 --- GYRO EFFECT OF SHAFT (TAPER)

END COND.= 0 --- FREE
1 --- BEARING
2 --- ROLL (ONLY RIGHT END SPAN)
3 --- FIXED (ONLY RIGHT END SPAN)

TS 1323/4/5 512401 3/5

**** VIBRATION MODE AND FREQUENCY AT SHAFT SPEED 83,000 (RPM) ***** ** MODE NO. 1 <NO.CAL=0- 2>

-------- NATURAL FREQUENCY N(1) = 510,376 (CPM) --------

SECTION NO.	LOCATION (MM)	--- HORIZONTAL --- DISP.	INCLINATION	MOMENT	SHEAR F.	--- VERTICAL --- DISP.	INCLINATION	MOMENT	SHEAR F.
/LEFT END CONDITION/		0,1000D+01	-0,3592D-03	0,0	0,0	-0,1000D+01	-0,3592D-03	0,0	0,0
1	0,0	0,1000D+01	-0,3592D-03	0,6335D+08	-0,1281D+06	-0,1000D+01	-0,3592D-03	0,6335D+08	0,1281D+06
2	401,750	0,8575D+00	-0,3494D-03	0,1148D+09	-0,1317D+06	-0,8575D+00	-0,3494D-03	0,1148D+09	0,1317D+06
3	803,500	0,7200D+00	-0,3338D-03	0,1677D+09	-0,1348D+06	-0,7200D+00	-0,3338D-03	0,1677D+09	0,1348D+06
4	1205,250	0,5900D+00	-0,3124D-03	0,2219D+09	-0,1373D+06	-0,5900D+00	-0,3124D-03	0,2219D+09	0,1373D+06
5	1607,000	0,4698D+00	-0,2849D-03	0,2771D+09	0,3416D+05	-0,4698D+00	-0,2849D-03	0,2771D+09	-0,3416D+05
6	2156,250	0,3245D+00	-0,2446D-03	0,2583D+09	0,3228D+05	-0,3245D+00	-0,2446D-03	0,2583D+09	-0,3228D+05
7	2705,500	0,2006D+00	-0,2071D-03	0,2406D+09	0,3111D+05	-0,2006D+00	-0,2071D-03	0,2406D+09	-0,3111D+05
8	3254,750	0,9661D-01	-0,1721D-03	0,2235D+09	0,3055D+05	-0,9661D-01	-0,1721D-03	0,2235D+09	-0,3055D+05
9	3804,000	0,1109D-01	-0,1397D-03	0,2067D+09	0,3049D+05	-0,1109D-01	-0,1397D-03	0,2067D+09	-0,3049D+05
10	4353,250	-0,5734D-01	-0,1099D-03	0,1900D+09	0,3082D+05	0,5734D-01	-0,1099D-03	0,1900D+09	-0,3082D+05
11	4902,500	-0,1101D+00	-0,8254D-04	0,1730D+09	0,3146D+05	0,1101D+00	-0,8254D-04	0,1730D+09	-0,3146D+05
12	5451,750	-0,1485D+00	-0,5779D-04	0,1557D+09	0,3232D+05	0,1485D+00	-0,5779D-04	0,1557D+09	-0,3232D+05
13	6001,000	-0,1740D+00	-0,3568D-04	0,1380D+09	0,3333D+05	0,1740D+00	-0,3568D-04	0,1380D+09	-0,3333D+05
14	6550,250	-0,1882D+00	-0,1628D-04	0,1197D+09	0,3443D+05	0,1882D+00	-0,1628D-04	0,1197D+09	-0,3443D+05
15	7099,500	-0,1924D+00	0,3143D-06	0,1008D+09	0,3555D+05	0,1924D+00	0,3143D-06	0,1008D+09	-0,3555D+05
16	7648,750	-0,1884D+00	0,1402D-04	0,8125D+08	0,3664D+05	0,1884D+00	0,1402D-04	0,8125D+08	-0,3664D+05
17	8198,000	-0,1776D+00	0,2474D-04	0,6112D+08	0,3767D+05	0,1776D+00	0,2474D-04	0,6112D+08	-0,3767D+05
18	8747,250	-0,1618D+00	0,3238D-04	0,4043D+08	0,3861D+05	0,1618D+00	0,3238D-04	0,4043D+08	-0,3861D+05
19	9296,500	-0,1426D+00	0,3687D-04	0,1923D+08	0,3944D+05	0,1426D+00	0,3687D-04	0,1923D+08	-0,3944D+05
20	9845,750	-0,1218D+00	0,3814D-04	-0,2437D+07	0,4015D+05	0,1218D+00	0,3814D-04	-0,2437D+07	-0,4015D+05
21	10395,000	-0,1013D+00	0,3611D-04	-0,2449D+08	-0,4898D+04	0,1013D+00	0,3611D-04	-0,2449D+08	0,4898D+04
22	10853,750	-0,8542D-01	0,3317D-04	-0,2224D+08	-0,4483D+04	0,8542D-01	0,3317D-04	-0,2224D+08	0,4483D+04
23	11312,500	-0,7083D-01	0,3050D-04	-0,2018D+08	-0,4139D+04	0,7083D-01	0,3050D-04	-0,2018D+08	0,4139D+04
24	11771,250	-0,5740D-01	0,2808D-04	-0,1829D+08	-0,3861D+04	0,5740D-01	0,2808D-04	-0,1829D+08	0,3861D+04
25	12230,000	-0,4520D-01	0,2516D-04	-0,1651D+08	-0,3513D+04	0,4520D-01	0,2516D-04	-0,1651D+08	0,3513D+04
26	12650,000	-0,3541D-01	0,2149D-04	-0,1504D+08	-0,3402D+04	0,3541D-01	0,2149D-04	-0,1504D+08	0,3402D+04
27	13070,000	-0,2710D-01	0,1815D-04	-0,1361D+08	-0,3317D+04	0,2710D-01	0,1815D-04	-0,1361D+08	0,3317D+04
28	13490,000	-0,2012D-01	0,1515D-04	-0,1222D+08	-0,3255D+04	0,2012D-01	0,1515D-04	-0,1222D+08	0,3255D+04
29	13910,000	-0,1433D-01	0,1246D-04	-0,1085D+08	-0,3210D+04	0,1433D-01	0,1246D-04	-0,1085D+08	0,3210D+04
30	14330,000	-0,9604D-02	0,1010D-04	-0,9502D+07	-0,3180D+04	0,9604D-02	0,1010D-04	-0,9502D+07	0,3180D+04
31	14750,000	-0,5807D-02	0,8041D-05	-0,8167D+07	-0,3162D+04	0,5807D-02	0,8041D-05	-0,8167D+07	0,3162D+04
32	15170,000	-0,2807D-02	0,6295D-05	-0,6839D+07	-0,3153D+04	0,2807D-02	0,6295D-05	-0,6839D+07	0,3153D+04
33	15590,000	-0,4757D-03	0,4858D-05	-0,5515D+07	-0,3151D+04	0,4757D-03	0,4858D-05	-0,5515D+07	0,3151D+04
34	16010,000	0,1317D-02	0,3729D-05	-0,4191D+07	-0,3155D+04	-0,1317D-02	0,3729D-05	-0,4191D+07	0,3155D+04
35	16430,000	0,2699D-02	0,2908D-05	-0,2866D+07	-0,4669D+03	-0,2699D-02	0,2908D-05	-0,2866D+07	0,4669D+03
36	17100,000	0,4304D-02	0,1902D-05	-0,2553D+07	-0,4884D+03	-0,4304D-02	0,1902D-05	-0,2553D+07	0,4884D+03
37	17770,000	0,5274D-02	0,1015D-05	-0,2226D+07	-0,5147D+03	-0,5274D-02	0,1015D-05	-0,2226D+07	0,5147D+03
38	18440,000	0,5692D-02	0,2527D-06	-0,1881D+07	-0,5430D+03	-0,5692D-02	0,2527D-06	-0,1881D+07	0,5430D+03
39	19110,000	0,5642D-02	-0,3780D-06	-0,1517D+07	-0,5712D+03	-0,5642D-02	-0,3780D-06	-0,1517D+07	0,5712D+03
40	19780,000	0,5216D-02	-0,8702D-06	-0,1135D+07	-0,5972D+03	-0,5216D-02	-0,8702D-06	-0,1135D+07	0,5972D+03
41	20450,000	0,4509D-02	-0,1217D-05	-0,7345D+06	-0,6196D+03	-0,4509D-02	-0,1217D-05	-0,7345D+06	0,6196D+03
42	21120,000	0,3619D-02	-0,1413D-05	-0,3193D+06	-0,6377D+03	-0,3619D-02	-0,1413D-05	-0,3193D+06	0,6377D+03
43	21790,000	0,2651D-02	-0,1452D-05	0,1079D+06	-0,6509D+03	-0,2651D-02	-0,1452D-05	0,1079D+06	0,6509D+03
44	22460,000	0,1710D-02	-0,1331D-05	0,5440D+06	-0,6594D+03	-0,1710D-02	-0,1331D-05	0,5440D+06	0,6594D+03
45	23130,000	0,9038D-03	-0,1047D-05	0,9858D+06	0,2404D+03	-0,9038D-03	-0,1047D-05	0,9858D+06	-0,2404D+03
46	23650,000	0,4302D-03	-0,7809D-06	0,8608D+06	0,2387D+03	-0,4302D-03	-0,7809D-06	0,8608D+06	-0,2387D+03
47	24170,000	0,8546D-04	-0,5508D-06	0,7367D+06	0,2384D+03	-0,8546D-04	-0,5508D-06	0,7367D+06	-0,2384D+03
48	24690,000	-0,1489D-03	-0,3564D-06	0,6127D+06	0,2390D+03	0,1489D-03	-0,3564D-06	0,6127D+06	-0,2390D+03
49	25210,000	-0,2914D-03	-0,1978D-06	0,4884D+06	0,2401D+03	0,2914D-03	-0,1978D-06	0,4884D+06	-0,2401D+03
50	25730,000	-0,3609D-03	-0,7512D-07	0,3636D+06	0,2429D+03	0,3609D-03	-0,7512D-07	0,3636D+06	-0,2429D+03

SECTION NO.	LOCATION (MM)	--- HORIZONTAL --- DISP.	INCLINATION	MOMENT	SHEAR F.	--- VERTICAL --- DISP.	INCLIN TION	MOMENT	SHEAR F.
51	26187,000	-0,3763D-03	0,2876D-08	0,2526D+06	0,2442D+03	0,3763D-03	0,2876D-08	0,2526D+06	-0,2442D+03
52	26644,000	-0,3625D-03	0,5269D-07	0,1410D+06	0,2454D+03	0,3625D-03	0,5269D-07	0,1410D+06	-0,2454D+03
53	27101,000	-0,3324D-03	0,7418D-07	0,2879D+05	0,2466D+03	0,3324D-03	0,7418D-07	0,2879D+05	-0,2466D+03
54	27558,000	-0,2991D-03	0,6720D-07	-0,8389D+05	0,2476D+03	0,2991D-03	0,6720D-07	-0,8389D+05	-0,2476D+03
55	28015,000	-0,2754D-03	0,3164D-07	-0,1970D+06	0,2485D+03	0,2754D-03	0,3164D-07	-0,1970D+06	-0,2485D+03
56	28472,000	-0,2745D-03	-0,3263D-07	-0,3106D+06	0,2495D+03	0,2745D-03	-0,3263D-07	-0,3106D+06	-0,2495D+03
57	28929,000	-0,3096D-03	-0,1257D-06	-0,4246D+06	0,2505D+03	0,3096D-03	-0,1257D-06	-0,4246D+06	-0,2505D+03
58	29386,000	-0,3938D-03	-0,2477D-06	-0,5391D+06	0,2518D+03	0,3938D-03	-0,2477D-06	-0,5391D+06	-0,2518D+03
59	29843,000	-0,5404D-03	-0,3987D-06	-0,6542D+06	0,2537D+03	0,5404D-03	-0,3987D-06	-0,6542D+06	-0,2537D+03
60	30300,000	-0,7627D-03	-0,5790D-06	-0,7701D+06	-0,5064D+03	0,7627D-03	-0,5790D-06	-0,7701D+06	0,5064D+03
61	30770,625	-0,1078D-02	-0,7488D-06	-0,5318D+06	-0,5026D+03	0,1078D-02	-0,7488D-06	-0,5318D+06	0,5026D+03
62	31241,250	-0,1458D-02	-0,8566D-06	-0,2952D+06	-0,4975D+03	0,1458D-02	-0,8566D-06	-0,2952D+06	0,4975D+03
63	31711,875	-0,1874D-02	-0,9030D-06	-0,6110D+05	-0,4910D+03	0,1874D-02	-0,9030D-06	-0,6110D+05	0,4910D+03
64	32182,500	-0,2298D-02	-0,8888D-06	0,1700D+06	-0,4829D+03	0,2298D-02	-0,8888D-06	0,1700D+06	0,4829D+03
65	32653,125	-0,2701D-02	-0,8149D-06	0,3972D+06	-0,4734D+03	0,2701D-02	-0,8149D-06	0,3972D+06	0,4734D+03
66	33123,750	-0,3056D-02	-0,6823D-06	0,6200D+06	-0,4627D+03	0,3056D-02	-0,6823D-06	0,6200D+06	0,4627D+03
67	33594,375	-0,3335D-02	-0,4922D-06	0,8378D+06	-0,4511D+03	0,3335D-02	-0,4922D-06	0,8378D+06	0,4511D+03
68	34065,000	-0,3455D-02	0,2733D-13	0,1050D+07	-0,4450D+03	0,3455D-02	0,2733D-13	0,1050D+07	0,4450D+03

TS 1323/4/5 512402 4/5

1222

**** VIBRATION MODE AND FREQUENCY AT SHAFT SPEED 83,000 (RPM) ***** ** MODE NO. 1 <NO.CAL=0- 2>

-------- NATURAL FREQUENCY N(1) = 476,633 (CPM) -------- BACKWARD WHIRL

SECTION NO.	LOCATION (MM)	--- HORIZONTAL --- DISP.	INCLINATION	MOMENT	SHEAR F.	--- VERTICAL --- DISP.	INCLINATION	MOMENT	SHEAR F.
/LEFT END	CONDITION/	0,1000D+01	-0,3969D-03	0,0	0,0	-0,1000D+01	-0,3969D-03	0,0	0,0
1	0,0	0,1000D+01	-0,3969D-03	0,1193D+09	-0,1117D+06	-0,1000D+01	-0,3969D-03	0,1193D+09	0,1117D+06
2	401,750	0,8435D+00	-0,3813D-03	0,1642D+09	-0,1148D+06	-0,8435D+00	-0,3813D-03	0,1642D+09	0,1148D+06
3	803,500	0,6943D+00	-0,3607D-03	0,2104D+09	-0,1174D+06	-0,6943D+00	-0,3607D-03	0,2104D+09	0,1174D+06
4	1205,250	0,5544D+00	-0,3349D-03	0,2575D+09	-0,1195D+06	-0,5544D+00	-0,3349D-03	0,2575D+09	0,1195D+06
5	1607,000	0,4259D+00	-0,3039D-03	0,3055D+09	0,3623D+05	-0,4259D+00	-0,3039D-03	0,3055D+09	-0,3623D+05
6	2156,250	0,2713D+00	-0,2594D-03	0,2856D+09	0,3485D+05	-0,2713D+00	-0,2594D-03	0,2856D+09	-0,3485D+05
7	2705,500	0,1403D+00	-0,2179D-03	0,2665D+09	0,3414D+05	-0,1403D+00	-0,2179D-03	0,2665D+09	-0,3414D+05
8	3254,750	0,3144D-01	-0,1791D-03	0,2477D+09	0,3398D+05	-0,3144D-01	-0,1791D-03	0,2477D+09	-0,3398D+05
9	3804,000	-0,5697D-01	-0,1433D-03	0,2291D+09	0,3427D+05	0,5697D-01	-0,1433D-03	0,2291D+09	-0,3427D+05
10	4353,250	-0,1264D+00	-0,1102D-03	0,2102D+09	0,3491D+05	0,1264D+00	-0,1102D-03	0,2102D+09	-0,3491D+05
11	4902,500	-0,1785D+00	-0,7997D-04	0,1911D+09	0,3582D+05	0,1785D+00	-0,7997D-04	0,1911D+09	-0,3582D+05
12	5451,750	-0,2148D+00	-0,5268D-04	0,1714D+09	0,3690D+05	0,2148D+00	-0,5268D-04	0,1714D+09	-0,3690D+05
13	6001,000	-0,2369D+00	-0,2840D-04	0,1511D+09	0,3810D+05	0,2369D+00	-0,2840D-04	0,1511D+09	-0,3810D+05
14	6550,250	-0,2466D+00	-0,7217D-05	0,1302D+09	0,3935D+05	0,2466D+00	-0,7217D-05	0,1302D+09	-0,3935D+05
15	7099,500	-0,2455D+00	0,1076D-04	0,1086D+09	0,4060D+05	0,2455D+00	0,1076D-04	0,1086D+09	-0,4060D+05
16	7648,750	-0,2354D+00	0,2543D-04	0,8629D+08	0,4179D+05	0,2354D+00	0,2543D-04	0,8629D+08	-0,4179D+05
17	8198,000	-0,2181D+00	0,3670D-04	0,6334D+08	0,4290D+05	0,2181D+00	0,3670D-04	0,6334D+08	-0,4290D+05
18	8747,250	-0,1957D+00	0,4446D-04	0,3978D+08	0,4389D+05	0,1957D+00	0,4446D-04	0,3978D+08	-0,4389D+05
19	9296,500	-0,1700D+00	0,4863D-04	0,1567D+08	0,4475D+05	0,1700D+00	0,4863D-04	0,1567D+08	-0,4475D+05
20	9845,750	-0,1429D+00	0,4914D-04	-0,8906D+07	0,4547D+05	0,1429D+00	0,4914D-04	-0,8906D+07	-0,4547D+05
21	10395,000	-0,1167D+00	0,4592D-04	-0,3388D+08	-0,6482D+04	0,1167D+00	0,4592D-04	-0,3388D+08	0,6482D+04
22	10853,750	-0,9654D-01	0,4185D-04	-0,3091D+08	-0,6073D+04	0,9654D-01	0,4185D-04	-0,3091D+08	0,6073D+04
23	11312,500	-0,7821D-01	0,3814D-04	-0,2812D+08	-0,5742D+04	0,7821D-01	0,3814D-04	-0,2812D+08	0,5742D+04
24	11771,250	-0,6150D-01	0,3476D-04	-0,2549D+08	-0,5482D+04	0,6150D-01	0,3476D-04	-0,2549D+08	0,5482D+04
25	12230,000	-0,4650D-01	0,3069D-04	-0,2297D+08	-0,5170D+04	0,4650D-01	0,3069D-04	-0,2297D+08	0,5170D+04
26	12650,000	-0,3470D-01	0,2560D-04	-0,2080D+08	-0,5075D+04	0,3470D-01	0,2560D-04	-0,2080D+08	0,5075D+04
27	13070,000	-0,2493D-01	0,2100D-04	-0,1867D+08	-0,5007D+04	0,2493D-01	0,2100D-04	-0,1867D+08	0,5007D+04
28	13490,000	-0,1699D-01	0,1690D-04	-0,1657D+08	-0,4961D+04	0,1699D-01	0,1690D-04	-0,1657D+08	0,4961D+04
29	13910,000	-0,1067D-01	0,1329D-04	-0,1448D+08	-0,4932D+04	0,1067D-01	0,1329D-04	-0,1448D+08	0,4932D+04
30	14330,000	-0,5758D-02	0,1016D-04	-0,1241D+08	-0,4916D+04	0,5758D-02	0,1016D-04	-0,1241D+08	0,4916D+04
31	14750,000	-0,2062D-02	0,7515D-05	-0,1035D+08	-0,4910D+04	0,2062D-02	0,7515D-05	-0,1035D+08	0,4910D+04
32	15170,000	0,6219D-03	0,5347D-05	-0,8284D+07	-0,4912D+04	-0,6219D-03	0,5347D-05	-0,8284D+07	0,4912D+04
33	15590,000	0,2497D-02	0,3660D-05	-0,6221D+07	-0,4919D+04	-0,2497D-02	0,3660D-05	-0,6221D+07	0,4919D+04
34	16010,000	0,3763D-02	0,2452D-05	-0,4155D+07	-0,4929D+04	-0,3763D-02	0,2452D-05	-0,4155D+07	0,4929D+04
35	16430,000	0,4624D-02	0,1726D-05	-0,2085D+07	-0,3217D+03	-0,4624D-02	0,1726D-05	-0,2085D+07	0,3217D+03
36	17100,000	0,5530D-02	0,9925D-06	-0,1870D+07	-0,3457D+03	-0,5530D-02	0,9925D-06	-0,1870D+07	0,3457D+03
37	17770,000	0,5972D-02	0,3415D-06	-0,1638D+07	-0,3717D+03	-0,5972D-02	0,3415D-06	-0,1638D+07	0,3717D+03
38	18440,000	0,6008D-02	-0,2203D-06	-0,1389D+07	-0,3978D+03	-0,6008D-02	-0,2203D-06	-0,1389D+07	0,3978D+03
39	19110,000	0,5699D-02	-0,6864D-06	-0,1122D+07	-0,4226D+03	-0,5699D-02	-0,6864D-06	-0,1122D+07	0,4226D+03
40	19780,000	0,5111D-02	-0,1050D-05	-0,8393D+06	-0,4448D+03	-0,5111D-02	-0,1050D-05	-0,8393D+06	0,4448D+03
41	20450,000	0,4315D-02	-0,1307D-05	-0,5413D+06	-0,4636D+03	-0,4315D-02	-0,1307D-05	-0,5413D+06	0,4636D+03
42	21120,000	0,3385D-02	-0,1450D-05	-0,2307D+06	-0,4783D+03	-0,3385D-02	-0,1450D-05	-0,2307D+06	0,4783D+03
43	21790,000	0,2398D-02	-0,1476D-05	0,8972D+05	-0,4887D+03	-0,2398D-02	-0,1476D-05	0,8972D+05	0,4887D+03
44	22460,000	0,1434D-02	-0,1382D-05	0,4171D+06	-0,4949D+03	-0,1434D-02	-0,1382D-05	0,4171D+06	0,4949D+03
45	23130,000	0,5735D-03	-0,1166D-05	0,7488D+06	0,7637D+02	-0,5735D-03	-0,1166D-05	0,7488D+06	-0,7637D+02
46	23650,000	0,2245D-04	-0,9557D-06	0,7090D+06	0,7630D+02	-0,2245D-04	-0,9557D-06	0,7090D+06	-0,7630D+02
47	24170,000	-0,4224D-03	-0,7572D-06	0,6694D+06	0,7772D+02	0,4224D-03	-0,7572D-06	0,6694D+06	-0,7772D+02
48	24690,000	-0,7670D-03	-0,5702D-06	0,6289D+06	0,8031D+02	0,7670D-03	-0,5702D-06	0,6289D+06	-0,8031D+02
49	25210,000	-0,1017D-02	-0,3950D-06	0,5872D+06	0,8374D+02	0,1017D-02	-0,3950D-06	0,5872D+06	-0,8374D+02
50	25730,000	-0,1180D-02	-0,2321D-06	0,5436D+06	0,9173D+02	0,1180D-02	-0,2321D-06	0,5436D+06	-0,9173D+02

SECTION NO.	LOCATION (MM)	--- HORIZONTAL --- DISP.	INCLINATION	MOMENT	SHEAR F.	--- VERTICAL --- DISP.	INCLINATION	MOMENT	SHEAR F.
51	26187,000	-0,1255D-02	-0,9977D-07	0,5017D+06	0,9545D+02	0,1255D-02	-0,9977D-07	0,5017D+06	-0,9545D+02
52	26644,000	-0,1273D-02	0,2173D-07	0,4581D+06	0,9922D+02	0,1273D-02	0,2173D-07	0,4581D+06	-0,9922D+02
53	27101,000	-0,1237D-02	0,1320D-06	0,4128D+06	0,1029D+03	0,1237D-02	0,1320D-06	0,4128D+06	-0,1029D+03
54	27558,000	-0,1154D-02	0,2305D-06	0,3657D+06	0,1063D+03	0,1154D-02	0,2305D-06	0,3657D+06	-0,1063D+03
55	28015,000	-0,1028D-02	0,3170D-06	0,3171D+06	0,1094D+03	0,1028D-02	0,3170D-06	0,3171D+06	-0,1094D+03
56	[illegible]472,000	-0,8661D-03	0,3909D-06	0,2672D+06	0,1119D+03	0,8661D-03	0,3909D-06	0,2672D+06	-0,1119D+03
57	28929,000	-0,6730D-03	0,4521D-06	0,2160D+06	0,1139D+03	0,6730D-03	0,4521D-06	0,2160D+06	-0,1139D+03
58	29386,000	-0,4549D-03	0,5002D-06	0,1639D+06	0,1153D+03	0,4549D-03	0,5002D-06	0,1639D+06	-0,1153D+03
59	29843,000	-0,2178D-03	0,5350D-06	0,1113D+06	0,1159D+03	0,2178D-03	0,5350D-06	0,1113D+06	-0,1159D+03
60	30300,000	0,3212D-04	0,5565D-06	0,5829D+05	0,1479D+03	-0,3212D-04	0,5565D-06	0,5829D+05	-0,1479D+03
61	30770,625	0,2962D-03	0,5626D-06	-0,1134D+05	0,1470D+03	-0,2962D-03	0,5626D-06	-0,1134D+05	-0,1470D+03
62	31241,250	0,5588D-03	0,5506D-06	-0,8054D+05	0,1453D+03	-0,5588D-03	0,5506D-06	-0,8054D+05	-0,1453D+03
63	31711,875	0,8117D-03	0,5207D-06	-0,1489D+06	0,1429D+03	-0,8117D-03	0,5207D-06	-0,1489D+06	-0,1429D+03
64	32182,500	0,1046D-02	0,4731D-06	-0,2162D+06	0,1397D+03	-0,1046D-02	0,4731D-06	-0,2162D+06	-0,1397D+03
65	32653,125	0,1254D-02	0,4082D-06	-0,2819D+06	0,1358D+03	-0,1254D-02	0,4082D-06	-0,2819D+06	-0,1358D+03
66	33123,750	0,1428D-02	0,3264D-06	-0,3458D+06	0,1315D+03	-0,1428D-02	0,3264D-06	-0,3458D+06	-0,1315D+03
67	33594,375	0,1559D-02	0,2281D-06	-0,4077D+06	0,1267D+03	-0,1559D-02	0,2281D-06	-0,4077D+06	-0,1267D+03
68	34065,000	0,1614D-02	0,2841D-13	-0,4673D+06	0,1242D+03	-0,1614D-02	0,2841D-13	-0,4673D+06	-0,1242D+03

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL					22 Jun '87	7-8-2 JC/md		
REV. A	FEB. 10 1986	OFTS/MES-1197						

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO. 1323	DOCTOR LYKES	NO. 1158	JAMES LYKES
NO. 1324	ALMERIA LYKES	NO. 1159	JOSEPH LYKES
NO. 1325	TILLIE LYKES	NO. 1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

FINISHED PLAN

SHIP DESIGN DEPARTMENT
MANAGER

SHIP'S NO. **1325**

SHIP'S NAME **TILLIE LYKES**

CO-ORDINATION SECTION
SEC.
ASSIST. CHIEF
CHARGE
STAFF
DATE (TEL)

5. 1987

HYDROSTATIC TABLE

JOB NO. TS1323/24/25
JOBCLASSIF. NO.
SCALE
LYKES REF. NO. 291301
MITSUI DRAWING NO. 1102081

(10 SHEETS WITH COVER)

1

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE	NOV. 10, 1986
		APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	K.A. MA

GENERAL NOTES

1. Principal dimensions

   Length P.P. : 245.000 M
   Breadth (mld.) : 32.200 M
   Depth (mld.) : 18.800 M

2. Displacement includes following appendages

   Rudder
   Rudder stock
   Propeller
   Bossing
   Thruster
   Bilge keels
   Rudder trunk (minus appendage)
   Sea chests (" ")
   Thruster well (" ")

3. Specific gravity of sea water is 1.025

4. Key to symbols

   DRAFT : Measured from bottom of keel (i.e. 40 MM below base line)
   DISPT. : Displacement includes all appendages and shell
   LCB : Longitudinal Center of Buoyancy from midship (⊗)
   LCF : Longitudinal Center of Floatation from midship (⊗)
   MTC : Moment to change Trim one (1) Centimeter
   TPC : Metric Tons Per one (1) Centimeter immersion
   KM : Transverse Metacenter above top of Keel (i.e. base line)
   VCB : Vertical Center of Buoyancy above top of keel (i.e. base line)

   Measurement references -
   LCB and LCF ...... Minus sign (-) : Forward of midship (⊗)
   No sign " : Aft of midship (⊗)

5. Units

   FT-IN : Feet - inches
   M : Meters
   MT : Metric tons
   MT-M : Metric tons - meters

DRAFT (FT-IN)	DRAFT (M)	DISPT. (MT)	LCB (M)	LCF (M)	MTC (MT-M)	TPC (MT)	KM (M)	VCB (M)
10- 0	3.048	11070	7.86	6.00	409.0	45.0	26.25	1.65
1	3.073	11185	7.84	5.99	410.7	45.1	26.11	1.66
2	3.099	11300	7.83	5.97	412.4	45.2	25.97	1.67
3	3.124	11415	7.81	5.96	414.1	45.3	25.83	1.69
4	3.150	11531	7.80	5.95	415.7	45.4	25.70	1.70
5	3.175	11647	7.78	5.93	417.4	45.5	25.56	1.72
6	3.200	11763	7.77	5.92	419.0	45.6	25.43	1.73
7	3.226	11879	7.76	5.91	420.7	45.7	25.30	1.74
8	3.251	11996	7.74	5.89	422.3	45.8	25.17	1.76
9	3.277	12113	7.73	5.88	423.9	45.9	25.04	1.77
10	3.302	12231	7.72	5.86	425.5	46.0	24.92	1.79
11	3.327	12348	7.70	5.85	427.1	46.1	24.79	1.80
11- 0	3.353	12466	7.69	5.84	428.7	46.2	24.67	1.81
1	3.378	12584	7.68	5.82	430.3	46.3	24.55	1.83
2	3.404	12703	7.67	5.81	431.9	46.4	24.43	1.84
3	3.429	12821	7.66	5.79	433.5	46.5	24.32	1.86
4	3.454	12940	7.64	5.78	435.1	46.6	24.20	1.87
5	3.480	13059	7.63	5.77	436.6	46.7	24.09	1.88
6	3.505	13179	7.62	5.76	438.2	46.8	23.98	1.90
7	3.531	13298	7.61	5.74	439.7	46.9	23.87	1.91
8	3.556	13418	7.60	5.73	441.3	47.0	23.76	1.93
9	3.581	13538	7.59	5.72	442.8	47.0	23.66	1.94
10	3.607	13658	7.58	5.71	444.3	47.1	23.55	1.95
11	3.632	13779	7.57	5.69	445.8	47.2	23.45	1.97
12- 0	3.658	13900	7.56	5.68	447.3	47.3	23.35	1.98
1	3.683	14021	7.55	5.67	448.8	47.4	23.25	2.00
2	3.708	14142	7.54	5.66	450.3	47.5	23.15	2.02
3	3.734	14264	7.53	5.65	451.8	47.6	23.06	2.03
4	3.759	14386	7.52	5.64	453.3	47.6	22.96	2.05
5	3.785	14508	7.52	5.63	454.8	47.7	22.87	2.06
6	3.810	14630	7.51	5.62	456.3	47.8	22.77	2.08
7	3.835	14753	7.50	5.60	457.7	47.9	22.68	2.09
8	3.861	14876	7.49	5.59	459.2	48.0	22.59	2.10
9	3.886	14999	7.48	5.58	460.6	48.1	22.50	2.12
10	3.912	15122	7.47	5.57	462.1	48.2	22.42	2.13
11	3.937	15245	7.46	5.56	463.5	48.2	22.33	2.15
13- 0	3.962	15369	7.45	5.55	465.0	48.3	22.24	2.16
1	3.988	15493	7.44	5.54	466.4	48.4	22.16	2.17
2	4.013	15616	7.43	5.54	467.9	48.5	22.08	2.19
3	4.039	15740	7.42	5.53	469.3	48.6	21.99	2.20
4	4.064	15864	7.41	5.52	470.8	48.6	21.91	2.22
5	4.089	15989	7.40	5.52	472.3	48.7	21.83	2.23
6	4.115	16113	7.39	5.51	473.8	48.8	21.75	2.24
7	4.140	16238	7.38	5.50	475.2	48.9	21.67	2.26
8	4.166	16363	7.37	5.50	476.7	49.0	21.59	2.27
9	4.191	16488	7.35	5.49	478.2	49.0	21.51	2.29
10	4.216	16613	7.34	5.49	479.6	49.1	21.43	2.30
11	4.242	16738	7.33	5.48	481.1	49.2	21.35	2.31
14- 0	4.267	16864	7.32	5.47	482.6	49.3	21.28	2.33
1	4.293	16990	7.31	5.47	484.0	49.4	21.20	2.34
2	4.318	17116	7.30	5.46	485.5	49.4	21.13	2.35
3	4.343	17242	7.28	5.46	486.9	49.5	21.06	2.37
4	4.369	17368	7.27	5.46	488.3	49.6	20.99	2.38
5	4.394	17495	7.26	5.45	489.8	49.7	20.92	2.40
6	4.420	17622	7.25	5.45	491.2	49.8	20.85	2.41
7	4.445	17749	7.24	5.44	492.6	49.8	20.78	2.42
8	4.470	17876	7.23	5.44	494.0	49.9	20.71	2.44
9	4.496	18003	7.22	5.44	495.5	50.0	20.64	2.45
10	4.521	18131	7.21	5.44	496.9	50.1	20.56	2.47
11	4.547	18259	7.20	5.44	498.3	50.1	20.51	2.48
15- 0	4.572	18387	7.19	5.43	499.7	50.2	20.45	2.49

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DRAFT (FT-IN)	DRAFT (M)	DISPT. (MT)	LCB (M)	LCF (M)	MTC (MT-M)	TPC (MT)	K M (M)	VCB (M)
15- 0	4.572	18387	7.19	5.43	499.7	50.2	20.45	2.49
1	4.597	18515	7.18	5.43	501.1	50.3	20.39	2.51
2	4.623	18643	7.17	5.43	502.4	50.4	20.32	2.52
3	4.648	18772	7.16	5.42	503.8	50.4	20.26	2.54
4	4.674	18901	7.15	5.42	505.2	50.5	20.20	2.55
5	4.699	19030	7.14	5.42	506.6	50.6	20.14	2.57
6	4.724	19159	7.12	5.41	508.0	50.6	20.08	2.58
7	4.750	19288	7.11	5.41	509.3	50.7	20.02	2.60
8	4.775	19417	7.10	5.40	510.7	50.8	19.96	2.62
9	4.801	19547	7.09	5.40	512.0	50.9	19.90	2.63
10	4.826	19677	7.08	5.40	513.4	50.9	19.84	2.64
11	4.851	19807	7.07	5.40	514.7	51.0	19.79	2.66
16- 0	4.877	19937	7.06	5.39	516.0	51.1	19.73	2.67
1	4.902	20067	7.05	5.39	517.4	51.1	19.68	2.69
2	4.928	20197	7.04	5.39	518.7	51.2	19.62	2.70
3	4.953	20328	7.03	5.39	520.0	51.3	19.57	2.71
4	4.978	20459	7.02	5.38	521.3	51.3	19.51	2.73
5	5.004	20590	7.01	5.38	522.6	51.4	19.46	2.74
6	5.029	20721	7.00	5.37	523.9	51.5	19.41	2.76
7	5.055	20852	6.99	5.37	525.2	51.5	19.36	2.77
8	5.080	20984	6.98	5.37	526.4	51.6	19.31	2.78
9	5.105	21116	6.97	5.36	527.7	51.7	19.26	2.80
10	5.131	21248	6.96	5.35	528.9	51.7	19.21	2.81
11	5.156	21380	6.95	5.35	530.2	51.8	19.16	2.83
17- 0	5.182	21512	6.95	5.34	531.4	51.9	19.11	2.84
1	5.207	21644	6.94	5.34	532.6	51.9	19.06	2.85
2	5.232	21777	6.93	5.33	533.8	52.0	19.01	2.87
3	5.258	21910	6.92	5.33	535.1	52.1	18.96	2.88
4	5.283	22042	6.91	5.32	536.3	52.1	18.91	2.90
5	5.309	22175	6.91	5.32	537.4	52.2	18.87	2.91
6	5.334	22308	6.90	5.31	538.6	52.2	18.82	2.92
7	5.359	22442	6.89	5.31	539.8	52.3	18.77	2.94
8	5.385	22575	6.88	5.30	541.0	52.4	18.73	2.95
9	5.410	22709	6.88	5.30	542.2	52.4	18.68	2.97
10	5.436	22843	6.87	5.29	543.4	52.5	18.64	2.98
11	5.461	22977	6.86	5.28	544.5	52.5	18.59	2.99
18- 0	5.486	23111	6.85	5.28	545.7	52.6	18.55	3.01
1	5.512	23245	6.85	5.27	546.9	52.7	18.51	3.02
2	5.537	23380	6.84	5.27	548.0	52.7	18.46	3.03
3	5.563	23514	6.83	5.26	549.2	52.8	[illegible]	3.05
4	5.588	23649	6.82	5.25	550.4	52.8	[illegible]	3.06
5	5.613	23784	6.82	5.25	551.5	52.9	18.34	3.08
6	5.639	23919	6.81	5.24	552.6	53.0	18.30	3.09
7	5.664	24054	6.80	5.24	553.8	53.0	18.26	3.11
8	5.690	24190	6.79	5.23	554.9	53.1	18.22	3.12
9	5.715	24325	6.79	5.23	556.0	53.1	18.18	3.14
10	5.740	24460	6.78	5.22	557.2	53.2	18.14	3.15
11	5.766	24596	6.77	5.22	558.3	53.2	18.10	3.17
19- 0	5.791	24732	6.76	5.21	559.4	53.3	18.06	3.18
1	5.817	24868	6.76	5.21	560.5	53.4	18.03	3.20
2	5.842	25004	6.75	5.20	561.7	53.4	17.99	3.21
3	5.867	25140	6.74	5.20	562.8	53.5	17.95	3.23
4	5.893	25277	6.73	5.19	564.0	53.5	17.91	3.24
5	5.918	25413	6.72	5.19	565.1	53.6	17.88	3.26
6	5.944	25550	6.72	5.18	566.2	53.6	17.84	3.27
7	5.969	25687	6.71	5.18	567.4	53.7	17.80	3.28
8	5.994	25824	6.70	5.17	568.5	53.7	17.77	3.30
9	6.020	25961	6.69	5.16	569.5	53.8	17.73	3.31
10	6.045	26098	6.69	5.16	570.6	53.9	17.70	3.32
11	6.071	26235	6.68	5.15	571.6	53.9	17.66	3.34
20- 0	6.096	26372	6.67	5.14	572.6	54.0	17.63	3.35

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DRAFT (FT-IN)	DRAFT (M)	DISPT. (MT)	LCB (M)	LCF (M)	MTC (MT-M)	TPC (MT)	K M (M)	VCB (M)
20- 0	6.096	26372	6.67	5.14	572.6	54.0	17.63	3.35
1	6.121	26509	6.66	5.13	573.7	54.0	17.59	3.37
2	6.147	26647	6.66	5.13	574.7	54.1	17.56	3.38
3	6.172	26784	6.65	5.12	575.7	54.1	17.53	3.39
4	6.198	26922	6.64	5.11	576.7	54.2	17.49	3.41
5	6.223	27060	6.63	5.10	577.7	54.2	17.46	3.42
6	6.248	27198	6.63	5.09	578.8	54.3	17.43	3.44
7	6.274	27336	6.62	5.09	579.8	54.3	17.40	3.45
8	6.299	27474	6.61	5.08	580.8	54.4	17.36	3.46
9	6.325	27613	6.60	5.07	581.9	54.4	17.33	3.48
10	6.350	27751	6.59	5.06	582.9	54.5	17.30	3.49
11	6.375	27890	6.59	5.06	584.0	54.5	17.27	3.51
21- 0	6.401	28028	6.58	5.05	585.0	54.6	17.24	3.52
1	6.426	28167	6.57	5.04	586.1	54.6	17.21	3.53
2	6.452	28306	6.57	5.04	587.1	54.7	17.18	3.55
3	6.477	28445	6.56	5.03	588.2	54.7	17.15	3.56
4	6.502	28585	6.55	5.03	589.3	54.8	17.11	3.58
5	6.528	28724	6.55	5.03	590.4	54.8	17.08	3.59
6	6.553	28863	6.54	5.02	591.5	54.9	17.05	3.60
7	6.579	29003	6.54	5.02	592.6	54.9	17.02	3.62
8	6.604	29143	6.53	5.02	593.7	55.0	17.00	3.63
9	6.629	29283	6.52	5.02	594.8	55.0	16.97	3.65
10	6.655	29423	6.51	5.02	595.9	55.1	16.94	3.66
11	6.680	29564	6.51	5.01	597.1	55.1	16.91	3.67
22- 0	6.706	29704	6.50	5.01	598.3	55.2	16.89	3.69
1	6.731	29845	6.49	5.01	599.4	55.2	16.86	3.70
2	6.756	29986	6.48	5.02	600.6	55.3	16.83	3.72
3	6.782	30127	6.48	5.02	601.8	55.3	16.81	3.73
4	6.807	30268	6.47	5.02	603.0	55.4	16.78	3.74
5	6.833	30409	6.46	5.02	604.2	55.4	16.76	3.76
6	6.858	30551	6.46	5.03	605.5	55.5	16.73	3.77
7	6.883	30692	6.45	5.03	606.7	55.5	16.70	3.79
8	6.909	30834	6.45	5.04	608.0	55.6	16.68	3.80
9	6.934	30976	6.44	5.05	609.3	55.6	16.65	3.81
10	6.960	31118	6.44	5.06	610.7	55.7	16.63	3.83
11	6.985	31260	6.43	5.07	612.1	55.7	16.60	3.84
23- 0	7.010	31402	6.43	5.09	613.5	55.8	16.58	3.86
1	7.036	31545	6.42	5.11	615.1	55.9	16.56	3.87
2	7.061	31688	6.42	5.13	616.7	55.9	16.54	3.89
3	7.087	31831	6.42	5.15	618.3	56.0	16.51	3.90
4	7.112	31974	6.41	5.18	620.0	56.1	16.49	3.92
5	7.137	32118	6.41	5.21	621.7	56.1	16.47	3.93
6	7.163	32261	6.40	5.24	623.5	56.2	16.45	3.95
7	7.188	32405	6.40	5.27	625.3	56.3	16.43	3.96
8	7.214	32549	6.40	5.30	627.1	56.3	16.41	3.98
9	7.239	32693	6.40	5.33	628.9	56.4	16.39	3.99
10	7.264	32838	6.39	5.36	630.7	56.5	16.37	4.01
11	7.290	32982	6.39	5.39	632.6	56.5	16.35	4.02
24- 0	7.315	33127	6.39	5.43	634.4	56.6	16.33	4.03
1	7.341	33272	6.38	5.46	636.3	56.7	16.31	4.05
2	7.366	33417	6.38	5.50	638.2	56.7	16.29	4.06
3	7.391	33562	6.38	5.54	640.1	56.8	16.27	4.08
4	7.417	33707	6.38	5.57	642.1	56.9	16.25	4.09
5	7.442	33852	6.38	5.61	644.0	56.9	16.23	4.10
6	7.468	33998	6.38	5.65	645.9	57.0	16.21	4.12
7	7.493	34144	6.38	5.69	647.8	57.1	16.19	4.13
8	7.518	34289	6.38	5.73	649.8	57.2	16.17	4.15
9	7.544	34435	6.38	5.77	651.7	57.2	16.16	4.16
10	7.569	34582	6.38	5.81	653.7	57.3	16.14	4.17
11	7.595	34728	6.38	5.85	655.7	57.4	16.12	4.19
25- 0	7.620	34874	6.38	5.89	657.7	57.4	16.11	4.20

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DRAFT (FT-IN)	DRAFT (M)	DISPT. (MT)	LCB (M)	LCF (M)	MTC (MT-M)	TPC (MT)	K M (M)	VCB (M)
25- 0	7.620	34874	6.38	5.89	657.7	57.4	16.11	4.20
1	7.645	35021	6.38	5.93	659.7	57.5	16.09	4.21
2	7.671	35168	6.38	5.97	661.7	57.6	16.08	4.23
3	7.696	35315	6.37	6.01	663.7	57.7	16.06	4.24
4	7.722	35462	6.37	6.05	665.7	57.7	16.05	4.26
5	7.747	35610	6.37	6.09	667.7	57.8	16.03	4.27
6	7.772	35757	6.37	6.14	669.7	57.9	16.02	4.28
7	7.798	35905	6.37	6.18	671.7	57.9	16.00	4.30
8	7.823	36053	6.37	6.22	673.8	58.0	15.99	4.31
9	7.849	36201	6.37	6.26	675.8	58.1	15.97	4.33
10	7.874	36349	6.37	6.31	677.9	58.2	15.96	4.34
11	7.899	36498	6.37	6.35	679.9	58.2	15.94	4.35
26- 0	7.925	36646	6.38	6.39	681.9	58.3	15.93	4.37
1	7.950	36795	6.38	6.43	683.9	58.4	15.92	4.38
2	7.976	36944	6.38	6.47	685.8	58.4	15.90	4.40
3	8.001	37093	6.38	6.51	687.8	58.5	15.89	4.41
4	8.026	37242	6.38	6.54	689.6	58.6	15.88	4.43
5	8.052	37391	6.38	6.58	691.4	58.6	15.86	4.44
6	8.077	37541	6.38	6.61	693.2	58.7	15.85	4.46
7	8.103	37691	6.38	6.64	694.9	58.8	15.84	4.47
8	8.128	37840	6.39	6.66	696.6	58.8	15.82	4.49
9	8.153	37990	6.39	6.69	698.3	58.9	15.81	4.50
10	8.179	38141	6.39	6.72	700.0	58.9	15.80	4.52
11	8.204	38291	6.39	6.74	701.7	59.0	15.79	4.53
27- 0	8.230	38441	6.39	6.77	703.4	59.1	15.78	4.55
1	8.255	38592	6.39	6.80	705.0	59.1	15.76	4.56
2	8.280	38743	6.40	6.82	706.7	59.2	15.75	4.57
3	8.306	38894	6.40	6.85	708.3	59.2	15.74	4.59
4	8.331	39045	6.40	6.87	710.0	59.3	15.73	4.60
5	8.357	39196	6.40	6.90	711.7	59.4	15.72	4.62
6	8.382	39348	6.41	6.92	713.3	59.4	15.71	4.63
7	8.407	39499	6.41	6.95	715.0	59.5	15.70	4.64
8	8.433	39651	6.41	6.97	716.7	59.5	15.69	4.66
9	8.458	39803	6.42	7.00	718.4	59.6	15.68	4.67
10	8.484	39955	6.42	7.02	720.1	59.6	15.67	4.69
11	8.509	40107	6.43	7.05	721.8	59.7	15.66	4.70
28- 0	8.534	40260	6.43	7.07	723.5	59.8	15.65	4.71
1	8.560	40412	6.43	7.10	725.2	59.8	15.64	4.73
2	8.585	40565	6.44	7.12	726.9	59.9	15.63	4.74
3	8.611	40718	6.44	7.15	728.6	59.9	15.62	4.76
4	8.636	40871	6.45	7.18	730.3	60.0	15.61	4.77
5	8.661	41024	6.45	7.20	732.1	60.1	15.60	4.79
6	8.687	41177	6.46	7.23	733.8	60.1	15.59	4.80
7	8.712	41331	6.46	7.26	735.6	60.2	15.58	4.82
8	8.738	41485	6.47	7.28	737.3	60.2	15.57	4.83
9	8.763	41639	6.47	7.31	739.1	60.3	15.56	4.85
10	8.788	41793	6.48	7.34	740.9	60.4	15.55	4.86
11	8.814	41947	6.48	7.36	742.7	60.4	15.55	4.88
29- 0	8.839	42101	6.49	7.39	744.4	60.5	15.54	4.89
1	8.865	42256	6.49	7.42	746.2	60.5	15.53	4.91
2	8.890	42410	6.49	7.44	748.1	60.6	15.52	4.92
3	8.915	42565	6.50	7.47	749.9	60.7	15.51	4.93
4	8.941	42720	6.50	7.50	751.8	60.7	15.51	4.95
5	8.966	42875	6.50	7.53	753.6	60.8	15.50	4.96
6	8.992	43031	6.51	7.56	755.6	60.8	15.49	4.98
7	9.017	43186	6.51	7.59	757.5	60.9	15.49	4.99
8	9.042	43342	6.52	7.63	759.6	61.0	15.48	5.00
9	9.068	43497	6.53	7.67	761.6	61.0	15.47	5.02
10	9.093	43653	6.53	7.70	763.7	61.1	15.47	5.03
11	9.119	43809	6.54	7.74	765.8	61.2	15.46	5.04
30- 0	9.144	43965	6.55	7.78	768.0	61.2	15.45	5.06

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DRAFT (FT-IN)	DRAFT (M)	DISPT. (MT)	LCB (M)	LCF (M)	MTC (MT-M)	TPC (MT)	K M (M)	VCB (M)
30- 0	9.144	43965	6.55	7.78	768.0	61.2	15.45	5.06
1	9.169	44121	6.55	7.82	770.2	61.3	15.45	5.07
2	9.195	44278	6.56	7.86	772.3	61.4	15.44	5.09
3	9.220	44435	6.57	7.90	774.6	61.4	15.43	5.10
4	9.246	44591	6.57	7.94	776.8	61.5	15.43	5.12
5	9.271	44748	6.58	7.98	779.0	61.6	15.42	5.13
6	9.296	44905	6.58	8.03	781.3	61.6	15.42	5.15
7	9.322	45063	6.59	8.07	783.6	61.7	15.41	5.16
8	9.347	45220	6.60	8.11	785.9	61.8	15.40	5.18
9	9.373	45378	6.60	8.15	788.2	61.8	15.40	5.19
10	9.398	45536	6.61	8.20	790.5	61.9	15.39	5.21
11	9.423	45694	6.62	8.24	792.9	62.0	15.38	5.22
31- 0	9.449	45852	6.62	8.29	795.2	62.0	15.38	5.24
1	9.474	46010	6.63	8.33	797.6	62.1	15.37	5.25
2	9.500	46169	6.63	8.38	799.9	62.2	15.36	5.27
3	9.525	46327	6.64	8.42	802.3	62.3	15.36	5.28
4	9.550	46486	6.65	8.47	804.8	62.3	15.35	5.29
5	9.576	46645	6.65	8.52	807.2	62.4	15.35	5.31
6	9.601	46805	6.66	8.56	809.6	62.5	15.34	5.32
7	9.627	46964	6.67	8.61	812.1	62.5	15.33	5.33
8	9.652	47123	6.67	8.66	814.5	62.6	15.33	5.35
9	9.677	47283	6.68	8.71	817.0	62.7	15.32	5.36
10	9.703	47443	6.69	8.75	819.5	62.7	15.32	5.38
11	9.728	47603	6.70	8.80	822.0	62.8	15.31	5.39
32- 0	9.754	47763	6.71	8.85	824.6	62.9	15.31	5.40
1	9.779	47923	6.71	8.90	827.1	63.0	15.30	5.42
2	9.804	48084	6.72	8.95	829.6	63.0	15.30	5.43
3	9.830	48245	6.73	9.00	832.2	63.1	15.29	5.45
4	9.855	48406	6.74	9.04	834.8	63.2	15.29	5.46
5	9.881	48567	6.75	9.09	837.4	63.2	15.29	5.48
6	9.906	48728	6.76	9.14	840.0	63.3	15.28	5.49
7	9.931	48890	6.77	9.19	842.6	63.4	15.28	5.51
8	9.957	49051	6.77	9.24	845.2	63.5	15.28	5.52
9	9.982	49213	6.78	9.29	847.9	63.5	15.27	5.54
10	10.008	49376	6.79	9.33	850.5	63.6	15.27	5.55
11	10.033	49538	6.80	9.38	853.1	63.7	15.27	5.57
33- 0	10.058	49700	6.81	9.43	855.7	63.8	15.26	5.58
1	10.084	49863	6.82	9.48	858.4	63.8	15.26	5.60
2	10.109	50025	6.83	9.53	861.0	63.9	15.26	5.61
3	10.135	50188	6.84	9.58	863.6	64.0	15.26	5.62
4	10.160	50352	6.85	9.63	866.3	64.0	15.25	5.64
5	10.185	50515	6.85	9.68	869.0	64.1	15.25	5.65
6	10.211	50679	6.86	9.73	871.6	64.2	15.25	5.67
7	10.236	50842	6.88	9.78	874.3	64.3	15.25	5.68
8	10.262	51007	6.89	9.83	877.0	64.3	15.24	5.70
9	10.287	51171	6.90	9.87	879.7	64.4	15.24	5.71
9.1	10.290	51191	6.90	9.88	880.0	64.4	15.24	5.71
10	10.312	51335	6.91	9.92	882.4	64.5	15.24	5.73
11	10.338	51500	6.92	9.97	885.2	64.5	15.24	5.74
34- 0	10.363	51665	6.93	10.02	887.9	64.6	15.23	5.76
1	10.389	51830	6.94	10.07	890.7	64.7	15.23	5.77
2	10.414	51995	6.96	10.12	893.4	64.8	15.23	5.79
3	10.439	52160	6.97	10.17	896.2	64.8	15.23	5.80
4	10.465	52326	6.98	10.22	899.0	64.9	15.22	5.82
5	10.490	52492	6.99	10.27	901.9	65.0	15.22	5.83
6	10.516	52657	7.00	10.32	904.7	65.1	15.22	5.84
7	10.541	52824	7.01	10.37	907.5	65.1	15.22	5.86
8	10.566	52990	7.02	10.42	910.4	65.2	15.21	5.87
9	10.592	53156	7.03	10.47	913.3	65.3	15.21	5.89
10	10.617	53323	7.04	10.52	916.1	65.4	15.21	5.90
11	10.643	53490	7.05	10.58	919.0	[illegible]	15.21	5.92
35- 0	10.668	53657	7.06	10.63	921.9	65.5	15.21	5.93

DRAFT (FT-IN)	DRAFT (M)	DISPT. (MT)	LCB (M)	LCF (M)	MTC (MT-M)	TPC (MT)	K M (M)	VCB (M)
35- 0	10.668	53657	7.06	10.63	921.9	65.5	15.21	5.93
1	10.693	53824	7.08	10.68	924.8	65.6	15.20	5.95
2	10.719	53991	7.09	10.73	927.8	65.6	15.20	5.96
3	10.744	54159	7.10	10.78	930.7	65.7	15.20	5.98
4	10.770	54327	7.11	10.84	933.6	65.8	15.20	5.99
5	10.795	54495	7.13	10.89	936.6	65.9	15.20	6.01
6	10.820	54663	7.14	10.94	939.6	65.9	15.20	6.02
7	10.846	54831	7.15	10.99	942.6	66.0	15.20	6.04
8	10.871	55000	7.16	11.05	945.6	66.1	15.20	6.05
9	10.897	55169	7.18	11.10	948.6	66.2	15.2[illegible]	6.06
10	10.922	55338	7.19	11.15	951.6	66.2	15.20	6.08
11	10.947	55507	7.20	11.21	954.7	66.3	15.20	6.09
36- 0	10.973	55676	7.22	11.26	957.8	66.4	15.20	6.10
1	10.998	55846	7.23	11.32	961.0	66.5	15.20	6.12
2	11.024	56016	7.24	11.37	964.2	66.6	15.20	6.13
3	11.049	56186	7.26	11.43	967.5	66.6	15.20	6.15
4	11.074	56356	7.27	11.49	970.8	66.7	15.20	6.16
5	11.100	56527	7.29	11.56	974.2	66.8	15.20	6.18
6	11.125	56698	7.30	11.62	977.5	66.9	15.20	6.19
7	11.151	56869	7.32	11.68	980.9	67.0	15.20	6.21
8	11.176	57040	7.34	11.74	984.3	67.0	15.20	6.23
9	11.201	57211	7.35	11.80	987.8	67.1	15.20	6.24
10	11.227	57383	7.36	11.87	991.2	67.2	15.20	6.26
11	11.252	57555	7.38	11.93	994.7	67.3	15.20	6.27
37- 0	11.278	57727	7.39	11.99	998.2	67.4	15.20	6.29
1	11.303	57899	7.41	12.05	1001.7	67.4	15.20	6.30
2	11.328	58072	7.42	12.11	1005.2	67.5	15.20	6.32
3	11.354	58244	7.43	12.18	1008.7	67.6	15.20	6.33
4	11.379	58417	7.45	12.24	1012.2	67.7	15.20	6.35
5	11.405	58590	7.46	12.30	1015.7	67.8	15.20	6.36
6	11.430	58763	7.48	12.36	1019.2	67.9	15.20	6.38
7	11.455	58937	7.50	12.42	1022.7	67.9	15.20	6.39
8	11.481	59110	7.51	12.49	1026.2	68.0	15.20	6.40
9	11.506	59284	7.53	12.55	1029.7	68.1	15.20	6.42
10	11.532	59458	7.55	12.61	1033.2	68.2	15.21	6.43
11	11.557	59632	7.56	12.67	1036.7	68.3	15.21	6.45
38- 0	11.582	59806	7.58	12.73	1040.2	68.3	15.21	6.46
1	11.608	59981	7.59	12.79	1043.7	68.4	15.21	6.47
2	11.633	60155	7.61	12.85	1047.1	68.5	15.21	6.49
3	11.659	60330	7.63	12.91	1050.6	68.6	15.22	6.50
4	11.684	60505	7.64	12.96	1054.1	68.7	15.22	6.52
5	11.709	60680	7.66	13.02	1057.5	68.7	15.22	6.54
6	11.735	60855	7.67	13.08	1060.9	68.8	15.22	6.55
7	11.760	61031	7.69	13.13	1064.4	68.9	15.23	6.57
8	11.786	61206	7.70	13.19	1067.8	69.0	15.23	6.58
9	11.811	61382	7.72	13.24	1071.2	69.1	15.23	6.60
10	11.836	61558	7.73	13.30	1074.6	69.1	15.23	6.61
11	11.862	61734	7.75	13.35	1078.0	69.2	15.23	6.63
39- 0	11.887	61911	7.77	13.41	1081.4	69.3	15.23	6.64
1	11.913	62087	7.78	13.46	1084.7	69.4	15.24	6.66
1.3	11.920	62137	7.79	13.47	1085.7	69.4	15.24	6.66
2	11.938	62264	7.80	13.51	1088.1	69.4	15.24	6.67
3	11.963	62441	7.82	13.56	1091.3	69.5	15.24	6.69
4	11.989	62618	7.83	13.61	1094.6	69.6	15.24	6.70
5	12.014	62795	7.85	13.65	1097.7	69.7	15.24	6.72
6	12.040	62973	7.87	13.70	1100.8	69.7	15.24	6.73
7	12.065	63150	7.89	13.74	1103.8	69.8	15.25	6.75
8	12.090	63328	7.90	13.78	1106.8	69.9	15.25	6.76
9	12.116	63506	7.92	13.82	1109.8	69.9	15.25	6.78
10	12.141	63685	7.94	13.85	1112.7	70.0	15.25	6.80
11	12.167	63863	7.96	13.89	1115.6	70.1	15.26	6.81
40- 0	12.192	64042	7.97	13.92	1118.4	70.1	15.26	6.83

DRAFT (FT-IN)	DRAFT (M)	DISPT. (MT)	LCB (M)	LCF (M)	MTC (MT-M)	TPC (MT)	K M (M)	VCB (M)
40- 0	12.192	64042	7.97	13.92	1118.4	70.1	15.26	6.83
1	12.21[illegible]	64220	7.99	13.95	1121.2	70.2	15.26	6.84
2	12.243	64399	8.01	13.98	1124.0	70.3	15.27	6.85
3	12.268	64578	8.02	14.01	1126.8	70.3	15.27	6.87
4	12.294	64757	8.04	14.04	1129.5	70.4	15.27	6.88
5	12.319	64936	8.06	14.06	1132.3	70.4	15.28	6.90
6	12.344	65116	8.07	14.09	1135.0	70.5	15.28	6.91
7	12.370	65295	8.09	14.11	1137.6	70.6	15.29	6.92
8	12.395	65475	8.11	14.14	1140.3	70.6	15.29	6.94
9	12.421	65655	8.12	14.16	1142.9	70.7	15.29	6.95
10	12.446	65835	8.14	14.18	1145.6	70.8	15.30	6.97
11	12.471	66015	8.16	14.21	1148.2	70.8	15.30	6.98

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	DEC. 9 1985	OFTS/MES-1102						

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

FINISHED PLAN

SHIP DESIGN DEPARTMENT MANAGER

SHIP'S NO. **1325**

SHIP'S NAME **TILLIE LYKES**

CO-ORDINATION SECTION

SEC. CHIEF / ASSIST. CHIEF / CHARGE ENG'R / STAFF

MAR. 5 1987 — SHIP DESIGN DEPARTMENT

CORRECTION OF DISPLACEMENT FOR TRIM

DATE (TEL)

JOB NO. TS1323/24/25

SCALE

LYKES REF. NO. 291303

MITSUI DRAWING NO. 1102088

(15 SHEETS WITH COVER)

1

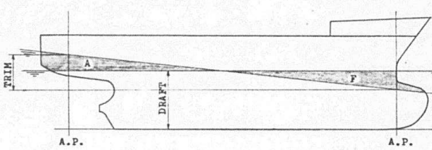
PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE	NOV. 10, 1986
		APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	K.A. MA

2

GENERAL NOTE

This table shows difference of displacement between wedge A and F in figures below.
Therefore, the table can be used to obtain accurate displacement from draft readings.



3

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT (M)	DRAFT (FT)	TRIM (M) -1.00 / (FT) -3.281	-0.90 / -2.953	-0.80 / -2.625	-0.70 / -2.297	-0.60 / -1.969	-0.50 / -1.640	-0.40 / -1.312	-0.30 / -0.984
4.0	13.123	-103	-94	-84	-75	-64	-54	-44	-33
1	13.451	-104	-94	-85	-75	-65	-54	-44	-33
2	13.780	-103	-94	-84	-75	-65	-54	-44	-33
3	14.108	-103	-94	-84	-74	-64	-54	-44	-33
4	14.436	-103	-93	-84	-74	-64	-54	-43	-33
5	14.764	-102	-93	-83	-74	-64	-54	-43	-33
6	15.092	-102	-92	-83	-73	-63	-53	-43	-32
7	15.420	-101	-92	-83	-73	-63	-53	-43	-32
8	15.748	-101	-92	-82	-73	-63	-53	-43	-32
9	16.076	-100	-91	-82	-72	-63	-53	-42	-32
5.0	16.404	-100	-91	-81	-72	-62	-52	-42	-32
1	16.732	-100	-91	-82	-72	-62	-52	-42	-32
2	17.060	-100	-91	-82	-72	-63	-53	-42	-32
3	17.388	-101	-92	-82	-73	-63	-53	-43	-32
4	17.717	-102	-92	-83	-73	-63	-53	-43	-32
5	18.045	-102	-93	-83	-73	-64	-53	-43	-32
6	18.373	-103	-94	-84	-74	-64	-54	-43	-32
7	18.701	-104	-94	-84	-74	-64	-54	-43	-33
8	19.029	-105	-95	-85	-75	-65	-54	-44	-33
9	19.357	-105	-95	-86	-75	-65	-55	-44	-33
6.0	19.685	-106	-96	-86	-76	-66	-55	-44	-33
1	20.013	-106	-96	-86	-76	-66	-55	-44	-33
2	20.341	-106	-96	-86	-76	-65	-55	-44	-33
3	20.669	-105	-96	-86	-76	-65	-55	-44	-33
4	20.997	-105	-96	-86	-76	-65	-55	-44	-33
5	21.325	-105	-95	-86	-76	-65	-55	-44	-33
6	21.654	-105	-95	-86	-76	-65	-55	-44	-33
7	21.982	-105	-96	-86	-76	-66	-55	-45	-34
8	22.310	-105	-96	-86	-76	-66	-55	-45	-34
9	22.638	-106	-96	-87	-77	-66	-56	-45	-34
7.0	22.966	-107	-97	-87	-77	-67	-56	-46	-35
1	23.924	-109	-99	-89	-79	-68	-57	-46	-35
2	23.622	-111	-101	-91	-81	-70	-59	-48	-36
3	23.950	-114	-104	-93	-83	-72	-60	-49	-37
4	24.278	-117	-107	-96	-85	-74	-62	-50	-38
5	24.606	-121	-110	-99	-87	-76	-64	-51	-39
6	24.934	-124	-113	-102	-90	-78	-66	-53	-40
7	25.263	-128	-116	-105	-93	-80	-67	-54	-41
8	25.591	-132	-120	-108	-95	-83	-69	-56	-42
9	25.919	-136	-124	-111	-98	-85	-71	-58	-44
8.0	26.247	-140	-127	-114	-101	-87	-74	-59	-45
1	26.575	-144	-131	-117	-104	-90	-75	-61	-46
2	26.903	-147	-134	-120	-106	-92	-77	-62	-47
3	27.231	-151	-137	-123	-109	-94	-79	-64	-48
4	27.559	-154	-140	-126	-111	-96	-81	-65	-49
5	27.887	-158	-143	-129	-114	-98	-83	-67	-50
6	28.215	-162	-147	-132	-116	-101	-85	-68	-51
7	28.543	-165	-150	-135	-119	-103	-87	-70	-53
8	28.871	-169	-154	-138	-122	-105	-88	-71	-54
9	29.200	-173	-157	-141	-124	-108	-90	-73	-55
9.0	29.528	-177	-161	-144	-127	-110	-93	-75	-56

1227

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT (M)	(FT)	TRIM (M) -0.30 / (FT) -0.984	-0.20 / -0.656	-0.10 / -0.328	0.0 / 0.0	0.10 / 0.328	0.20 / 0.656	0.30 / 0.984	0.40 / 1.312
4.0	13,123	-33	-22	-11	0	11	22	34	45
1	13.451	-33	-22	-11	0	11	22	34	45
2	13.780	-33	-22	-11	0	11	22	34	46
3	14,108	-33	-22	-11	0	11	22	34	46
4	14.436	-33	-22	-11	0	11	22	34	46
5	14.764	-33	-22	-11	0	11	22	34	46
6	15,092	-32	-22	-11	0	11	22	34	46
7	15.420	-32	-22	-11	0	11	22	34	46
8	15.748	-32	-22	-11	0	11	23	34	46
9	16,076	-32	-21	-11	0	11	23	34	47
5.0	16.404	-32	-21	-11	0	11	23	35	47
1	16,732	-32	-21	-11	0	11	23	34	47
2	17,060	-32	-21	-11	0	11	22	34	46
3	17,388	-32	-21	-11	0	11	22	34	46
4	17,717	-32	-21	-11	0	11	22	34	46
5	18,045	-32	-22	-11	0	11	22	34	45
6	18.373	-32	-22	-11	0	11	22	33	45
7	18,701	-33	-22	-11	0	11	22	33	45
8	19,029	-33	-22	-11	0	11	22	33	45
9	19,357	-33	-22	-11	0	11	22	33	44
6.0	19.685	-33	-22	-11	0	11	22	33	44
1	20,013	-33	-22	-11	0	11	22	33	45
2	20.341	-33	-22	-11	0	11	22	33	45
3	20,669	-33	-22	-11	0	11	22	34	45
4	20,997	-33	-22	-11	0	11	22	34	46
5	21.325	-33	-22	-11	0	11	23	35	47
6	21,654	-33	-22	-11	0	11	23	35	48
7	21,982	-34	-22	-11	0	11	23	36	48
8	22,310	-34	-23	-11	0	12	24	36	49
9	22,638	-34	-23	-11	0	12	24	37	50
7.0	22,966	-35	-23	-12	0	12	25	38	51
1	23,294	-35	-24	-12	0	12	25	39	52
2	23.622	-36	-24	-12	0	12	26	40	54
3	23,950	-37	-25	-12	0	13	26	40	55
4	24,278	-38	-25	-13	0	13	27	41	56
5	24,606	-39	-26	-13	0	13	28	42	57
6	24,934	-40	-27	-13	0	14	28	43	59
7	25,263	-41	-28	-14	0	14	29	44	60
8	25.591	-42	-28	-14	0	14	30	45	61
9	25,919	-44	-29	-15	0	15	31	47	63
8.0	26,247	-45	-30	-15	0	15	31	48	64
1	26,575	-46	-31	-15	0	16	32	49	66
2	26,903	-47	-32	-16	0	16	33	50	67
3	27,231	-48	-32	-16	0	16	33	51	68
4	27.559	-49	-33	-16	0	17	34	52	70
5	27,887	-50	-34	-17	0	17	35	53	71
6	28.215	-51	-34	-17	0	17	35	54	73
7	28,543	-53	-35	-18	0	18	36	55	74
8	28,871	-54	-36	-18	0	18	37	56	76
9	29.200	-55	-37	-18	0	18	38	57	77
9.0	29,528	-56	-38	-19	0	19	39	59	79

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT (M)	(FT)	TRIM (M) 0.40 / (FT) 1.312	0.50 / 1.640	0.60 / 1.969	0.70 / 2.297	0.80 / 2.625	0.90 / 2.953	1.00 / 3.281	1.10 / 3.609
4.0	13,123	45	57	69	82	95	108	121	134
1	13.451	45	57	70	82	95	108	121	134
2	13,780	46	58	70	82	95	108	121	134
3	14,108	46	58	70	83	95	108	121	135
4	14,436	46	58	70	83	96	109	122	135
5	14.764	46	58	71	83	96	109	122	136
6	15,092	46	58	71	84	96	109	123	136
7	15,420	46	59	71	84	97	110	123	137
8	15,748	46	59	71	84	97	110	124	137
9	16,076	47	59	72	84	97	111	124	138
5.0	16,404	47	59	72	84	98	111	124	138
1	16,732	47	59	71	84	97	110	124	137
2	17,060	46	58	71	84	96	110	123	136
3	17,388	46	58	70	83	96	109	122	135
4	17,717	46	58	70	82	95	108	121	134
5	18,045	45	57	69	82	94	107	120	133
6	18,373	45	57	69	81	94	106	119	132
7	18,701	45	56	68	81	93	106	118	131
8	19,029	45	56	68	80	92	105	118	131
9	19,357	44	56	68	80	92	105	117	130
6.0	19,685	44	56	68	80	92	105	117	130
1	20,013	45	56	68	80	93	105	118	131
2	20.341	45	57	69	81	94	106	119	132
3	20,669	45	57	70	82	95	108	121	134
4	20,997	46	58	71	83	96	109	123	136
5	21,325	47	59	72	85	98	111	125	139
6	21,654	48	60	73	86	100	113	127	141
7	21,982	48	61	74	88	101	115	130	144
8	22,310	49	62	76	90	103	118	132	147
9	22,638	50	64	77	91	106	120	135	150
7.0	22,966	51	65	79	93	108	123	138	153
1	23,294	52	66	81	95	110	125	141	157
2	23.622	54	68	83	97	113	128	144	160
3	23,950	55	69	84	100	115	131	147	164
4	24,278	56	71	86	102	118	134	150	167
5	24,606	57	73	88	104	120	137	154	171
6	24,934	59	74	90	106	123	140	157	175
7	25.263	60	76	92	109	126	143	161	178
8	25.591	61	78	94	111	129	146	164	182
9	25,919	63	80	97	114	131	149	168	186
8.0	26,247	64	81	99	116	134	153	171	190
1	26.575	66	83	101	119	137	156	175	194
2	26,903	67	85	103	121	140	159	178	198
3	27,231	68	86	105	123	142	162	182	202
4	27,559	70	88	107	126	145	165	185	206
5	27,887	71	90	109	128	148	168	189	210
6	28,215	73	92	111	131	151	172	193	214
7	28.543	74	93	113	134	154	175	196	218
8	28,871	76	95	116	136	157	179	201	223
9	29.200	77	97	118	139	161	183	205	228
9.0	29.528	79	100	121	142	164	187	209	233

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT (M)	(FT)	TRIM (M) 1.10 / (FT) 3.609	1.20 / 3.937	1.30 / 4.265	1.40 / 4.593	1.50 / 4.921	1.60 / 5.249	1.70 / 5.577	1.80 / 5.906
4.0	13,123	134	148	162	176	190	205	220	235
1	13.451	134	148	162	176	190	205	219	234
2	13,780	134	148	162	176	190	205	220	235
3	14,108	135	149	162	177	191	205	220	235
4	14.436	135	149	163	177	191	206	221	236
5	14.764	136	150	164	178	192	207	222	237
6	15,092	136	150	164	178	193	207	222	237
7	15.420	137	151	165	179	193	208	223	238
8	15,748	137	151	165	179	194	209	224	239
9	16,076	138	151	166	180	194	209	224	239
5.0	16,404	138	152	166	180	195	210	224	240
1	16,732	137	151	165	180	194	209	224	239
2	17,060	136	150	164	178	193	207	222	237
3	17,388	135	149	163	177	191	206	220	235
4	17.717	134	148	161	175	190	204	219	234
5	18,045	133	147	160	174	188	203	217	232
6	18,373	132	146	159	173	187	201	216	230
7	18,701	131	145	158	172	186	200	214	229
8	19,029	131	144	157	171	185	199	213	228
9	19,357	130	143	157	171	184	199	213	228
6.0	19.685	130	143	157	170	184	198	213	227
1	20.013	131	144	158	171	185	200	214	229
2	20.341	132	146	160	174	188	202	217	232
3	20.669	134	148	162	176	190	205	220	235
4	20,997	136	150	164	179	194	209	224	239
5	21.325	139	153	167	182	197	212	228	244
6	21.654	141	156	170	185	201	216	232	248
7	21,982	144	159	174	189	205	221	237	254
8	22,310	147	162	178	193	209	225	242	259
9	22,638	150	166	181	197	214	230	247	265
7.0	22,966	153	169	185	202	218	236	253	271
1	23,294	157	173	189	206	223	241	258	276
2	23,622	160	177	193	210	228	246	264	282
3	23,950	164	180	197	215	233	251	269	288
4	24.278	167	184	202	219	238	256	275	294
5	24,606	171	188	206	224	243	261	281	300
6	24,934	175	192	211	229	248	267	287	306
7	25,263	178	197	215	234	253	273	293	313
8	25.591	182	201	220	239	259	279	299	319
9	25,919	186	205	225	244	264	284	305	326
8.0	26,247	190	210	229	249	270	290	312	333
1	26,575	194	214	234	254	275	296	318	340
2	26,903	198	218	238	259	280	302	324	346
3	27,231	202	222	243	264	286	308	330	353
4	27,559	206	226	248	269	291	314	336	359
5	27,887	210	231	253	275	297	320	343	367
6	28.215	214	236	258	280	303	326	350	374
7	28,543	218	240	263	286	309	333	357	382
8	28,871	223	245	268	292	316	340	364	390
9	29.200	228	251	274	298	322	347	372	398
9.0	29 528	233	256	280	305	329	355	380	407

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT (M)	(FT)	TRIM (M) 1.80 / (FT) 5.906	1.90 / 6.234	2.00 / 6.562	2.10 / 6.890	2.20 / 7.218	2.30 / 7.546	2.40 / 7.874	2.50 / 8.202
4.0	13,123	235	250	266	282	298	314	331	348
1	13.451	234	250	265	281	297	313	330	347
2	13,780	235	250	266	281	297	314	330	347
3	14.108	235	251	266	282	298	314	331	347
4	14.436	236	251	267	283	299	315	331	348
5	14,764	237	252	267	283	299	315	332	348
6	15.092	237	253	268	284	300	316	333	349
7	15,420	238	253	269	285	301	317	333	350
8	15,748	239	254	270	285	301	318	334	351
9	16.076	239	255	270	286	302	318	335	351
5.0	16.404	240	255	271	287	303	319	335	352
1	16.732	239	254	270	286	302	318	334	351
2	17,060	237	252	268	284	299	316	332	348
3	17.388	235	250	266	281	297	313	330	346
4	17,717	234	249	264	279	295	311	327	344
5	18,045	232	247	262	278	293	309	325	342
6	18.373	230	245	260	276	292	308	324	340
7	18,701	229	244	259	275	290	306	322	339
8	19,029	228	243	258	274	289	305	321	338
9	19.357	228	242	258	273	289	305	321	338
6.0	19,685	227	242	258	273	289	305	321	338
1	20.013	229	244	260	275	291	307	324	341
2	20.341	232	247	263	279	295	311	328	345
3	20.669	235	251	267	283	299	316	333	350
4	20,997	239	255	271	288	304	321	338	356
5	21,325	244	260	276	293	310	327	345	363
6	21,654	248	265	282	299	316	333	351	370
7	21.982	254	270	287	305	322	340	359	377
8	22.310	259	276	294	311	329	347	366	385
9	22,638	265	282	300	318	336	355	374	393
7.0	22.966	271	288	307	325	344	363	382	402
1	23,294	276	295	313	332	351	370	390	410
2	23.622	282	301	320	339	358	378	398	418
3	23,950	288	307	326	346	365	385	406	427
4	24,278	294	313	333	353	373	393	414	435
5	24,606	300	320	340	360	381	401	423	444
6	24,934	306	326	347	367	388	410	431	453
7	25.263	313	333	354	375	396	418	440	462
8	25.591	319	340	361	383	405	427	449	472
9	25,919	326	347	369	391	413	436	458	482
8.0	26,247	333	355	377	399	422	445	468	491
1	26.575	340	362	384	407	430	453	477	501
2	26,903	346	369	392	415	438	462	486	511
3	27.231	353	376	399	423	447	471	496	521
4	27,559	359	383	407	431	455	480	505	531
5	27,887	367	391	415	439	464	490	516	542
6	28,215	374	398	423	448	474	500	526	553
7	28,543	382	407	432	458	484	510	537	565
8	28.871	390	415	441	467	494	521	549	577
9	29.200	398	424	451	477	505	532	561	590
9.0	29,528	407	433	460	488	516	544	573	603

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT (M)	(FT)	TRIM (M) 2.50 / (FT) 8.202	2.60 / 8.530	2.70 / 8.858	2.80 / 9.186	2.90 / 9.514	3.00 / 9.843
4.0	13.123	348	365	382	400	418	437
1	13.451	347	364	381	399	417	435
2	13.780	347	364	381	399	416	434
3	14.108	347	364	381	398	416	434
4	14.436	348	364	381	399	416	434
5	14.764	348	365	382	399	416	433
6	15.092	349	366	382	399	416	434
7	15.420	350	366	383	400	417	434
8	15.748	351	367	384	400	417	434
9	16.076	351	368	384	401	418	434
5.0	16.404	352	368	385	401	418	435
1	16.732	351	367	384	400	417	434
2	17.060	348	365	381	398	415	432
3	17.388	346	363	379	396	413	430
4	17.717	344	360	377	394	411	428
5	18.045	342	358	375	392	410	427
6	18.373	340	357	374	391	408	426
7	18.701	339	356	373	390	408	426
8	19.029	338	355	372	390	407	426
9	19.357	338	355	372	390	408	426
6.0	19.685	338	355	373	391	409	428
1	20.013	341	358	376	394	413	432
2	20.341	345	363	381	399	418	437
3	20.669	350	368	387	405	424	444
4	20.997	356	374	393	412	431	451
5	21.325	363	381	400	419	439	459
6	21.654	370	388	408	427	447	468
7	21.982	377	396	416	436	456	477
8	22.310	385	405	424	445	465	486
9	22.638	393	413	433	454	475	496
7.0	22.966	402	422	443	464	485	507
1	23.294	410	431	452	473	495	517
2	23.622	418	439	460	482	504	526
3	23.950	427	448	470	491	514	537
4	24.278	435	457	479	501	524	547
5	24.606	444	466	488	511	534	557
6	24.934	453	475	498	521	545	568
7	25.263	462	485	508	532	555	580
8	25.591	472	495	519	542	567	591
9	25.919	482	505	529	553	578	603
8.0	26.247	491	516	540	565	590	616
1	26.575	501	526	551	576	602	628
2	26.903	511	536	561	587	614	640
3	27.231	521	546	573	599	626	653
4	27.559	531	557	584	611	639	667
5	27.887	542	569	596	624	652	681
6	28.215	553	580	608	637	666	695
7	28.543	565	593	621	650	680	710
8	28.871	577	606	635	665	695	726
9	29.200	590	619	649	680	711	743
9.0	29.528	603	633	664	695	727	760

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT (M)	(FT)	TRIM (M) -1.00 / (FT) -3.281	-0.90 / -2.953	-0.80 / -2.625	-0.70 / -2.297	-0.60 / -1.969	-0.50 / -1.640	-0.40 / -1.312	-0.30 / -0.984
9.0	29.528	-177	-161	-144	-127	-110	-93	-75	-56
1	29.856	-181	-164	-147	-130	-112	-95	-76	-58
2	30.184	-185	-168	-151	-133	-115	-97	-78	-59
3	30.512	-189	-171	-154	-136	-117	-99	-80	-60
4	30.840	-193	-175	-157	-139	-120	-101	-81	-61
5	31.168	-197	-179	-161	-142	-123	-103	-83	-63
6	31.496	-201	-183	-164	-145	-126	-106	-85	-64
7	31.824	-206	-187	-168	-148	-128	-108	-87	-66
8	32.152	-211	-191	-172	-152	-131	-110	-89	-67
9	32.480	-216	-196	-176	-155	-134	-113	-91	-69
10.0	32.808	-221	-201	-180	-159	-138	-116	-94	-71
1	33.137	-226	-206	-185	-163	-141	-119	-96	-73
2	33.465	-233	-211	-190	-168	-145	-122	-99	-75
3	33.793	-239	-217	-195	-172	-149	-125	-101	-77
4	34.121	-245	-223	-200	-177	-153	-129	-104	-79
5	34.449	-252	-229	-206	-182	-157	-132	-107	-81
6	34.777	-259	-235	-211	-187	-162	-136	-110	-83
7	35.105	-266	-242	-217	-192	-166	-140	-113	-85
8	35.433	-273	-248	-223	-197	-170	-143	-116	-88
9	35.761	-280	-255	-229	-202	-175	-147	-119	-90
11.0	36.089	-287	-261	-234	-207	-179	-151	-122	-92
1	36.417	-295	-268	-240	-212	-184	-154	-125	-94
2	36.745	-303	-275	-247	-218	-188	-158	-128	-97
3	37.074	-311	-282	-253	-223	-193	-162	-131	-99
4	37.402	-318	-289	-259	-228	-197	-166	-134	-101
5	37.730	-326	-295	-265	-233	-202	-169	-136	-103
6	38.058	-333	-302	-270	-238	-206	-173	-139	-105
7	38.386	-340	-308	-276	-243	-210	-176	-142	-107
8	38.714	-346	-314	-281	-248	-214	-179	-144	-109
9	39.042	-353	-320	-286	-252	-217	-182	-146	-110
12.0	39.370	-359	-325	-290	-256	-220	-185	-149	-112

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT (M)	(FT)	TRIM (M) -0.30 / (FT) -0.984	-0.20 / -0.656	-0.10 / -0.328	0.0 / 0.0	0.10 / 0.328	0.20 / 0.656	0.30 / 0.984	0.40 / 1.312
9.0	29.528	-56	-38	-19	0	19	39	59	79
1	29.856	-58	-38	-19	0	19	39	60	81
2	30.184	-59	-39	-20	0	20	40	61	83
3	30.512	-60	-40	-20	0	20	41	63	85
4	30.840	-61	-41	-21	0	21	42	64	87
5	31.168	-63	-42	-21	0	21	44	66	89
6	31.496	-64	-43	-22	0	22	45	68	91
7	31.824	-66	-44	-22	0	22	46	70	94
8	32.152	-67	-45	-23	0	23	47	71	96
9	32.480	-69	-46	-23	0	24	48	73	99
10.0	32.808	-71	-47	-24	0	24	50	75	102
1	33.137	-73	-49	-24	0	25	51	78	105
2	33.465	-75	-50	-25	0	26	53	80	108
3	33.793	-77	-52	-26	0	27	54	82	111
4	34.121	-79	-53	-27	0	27	56	85	115
5	34.449	-81	-54	-27	0	28	57	87	118
6	34.777	-83	-56	-28	0	29	59	90	121
7	35.105	-85	-57	-29	0	30	61	92	125
8	35.433	-88	-59	-30	0	31	62	95	128
9	35.761	-90	-60	-30	0	31	64	97	131
11.0	36.089	-92	-62	-31	0	32	65	99	134
1	36.417	-94	-63	-32	0	33	67	102	137
2	36.745	-97	-65	-33	0	33	68	103	139
3	37.074	-99	-66	-33	0	34	69	105	142
4	37.402	-101	-68	-34	0	35	71	107	144
5	37.730	-103	-69	-35	0	35	72	109	146
6	38.058	-105	-70	-35	0	36	73	110	148
7	38.386	-107	-72	-36	0	36	74	112	150
8	38.714	-109	-73	-36	0	37	75	113	152
9	39.042	-110	-74	-37	0	37	75	114	153
12.0	39.370	-112	-75	-37	0	38	76	115	154

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT (M)	(FT)	TRIM (M) 0.40 / (FT) 1.312	0.50 / 1.640	0.60 / 1.969	0.70 / 2.297	0.80 / 2.625	0.90 / 2.953	1.00 / 3.281	1.10 / 3.609
9.0	29.528	79	100	121	142	164	187	209	233
1	29.856	81	102	124	146	168	191	214	238
2	30.184	83	104	127	149	172	196	220	244
3	30.512	85	107	130	153	177	201	225	250
4	30.840	87	110	133	157	181	206	231	257
5	31.168	89	113	137	161	186	211	237	263
6	31.496	91	116	140	165	191	217	243	270
7	31.824	94	119	144	170	196	222	250	277
8	32.152	96	122	148	174	201	228	256	285
9	32.480	99	125	152	179	206	234	263	292
10.0	32.808	102	128	156	184	212	241	270	300
1	33.137	105	132	160	189	218	248	278	309
2	33.465	108	136	165	195	225	255	286	318
3	33.793	111	141	170	201	232	263	295	328
4	34.121	115	145	175	207	238	271	304	337
5	34.449	118	149	181	213	245	278	312	346
6	34.777	121	153	186	219	252	286	321	356
7	35.105	125	157	191	224	259	294	329	365
8	35.433	128	161	196	230	265	301	337	374
9	35.761	131	165	200	236	272	308	345	383
11.0	36.089	134	169	205	241	278	315	353	391
1	36.417	137	173	209	246	283	321	359	398
2	36.745	139	176	213	250	288	326	365	405
3	37.074	142	179	216	254	292	331	371	410
4	37.402	144	182	219	258	297	336	376	416
5	37.730	146	184	222	261	301	340	380	421
6	38.058	148	186	225	264	304	344	385	426
7	38.386	150	189	228	267	307	348	389	430
8	38.714	152	191	230	270	310	351	392	433
9	39.042	153	192	232	272	313	354	395	437
12.0	39.370	154	194	234	275	315	356	398	440

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CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT		------ TRIM ------ (M)							
(M)	(FT)	1.10	1.20	1.30	1.40	1.50	1.60	1.70	1.80
	(FT)	3.609	3.937	4.265	4.593	4.921	5.249	5.577	5.906
9.0	29.528	233	256	280	305	329	355	380	407
1	29.856	238	262	287	312	337	363	390	416
2	30.184	244	269	294	320	346	372	399	427
3	30.512	250	276	301	328	355	382	410	438
4	30.840	257	283	309	336	364	392	420	449
5	31.168	263	290	317	345	373	402	431	461
6	31.496	270	298	326	354	383	412	442	473
7	31.824	277	305	334	363	393	423	454	485
8	32.152	285	314	343	373	404	435	466	498
9	32.480	292	322	352	383	414	446	478	511
10.0	32.808	300	331	362	393	425	458	491	525
1	33.137	309	340	372	404	437	471	505	539
2	33.465	318	350	383	416	450	484	519	555
3	33.793	328	361	394	428	463	498	534	570
4	34.121	337	371	405	440	476	512	548	585
5	34.449	346	381	416	452	489	525	563	601
6	34.777	356	391	427	464	501	539	577	616
7	35.105	365	401	438	476	514	552	591	630
8	35.433	374	411	449	487	526	565	605	645
9	35.761	383	421	459	498	537	577	618	658
11.0	36.089	391	430	469	508	549	589	630	672
1	36.417	398	438	477	517	558	599	641	683
2	36.745	405	444	485	525	566	608	650	692
3	37.074	410	451	491	532	574	616	658	701
4	37.402	416	457	498	539	581	623	666	709
5	37.730	421	462	503	545	587	630	673	716
6	38.058	426	467	508	550	593	636	679	722
7	38.386	430	471	513	555	598	641	684	728
8	38.714	433	475	517	560	603	646	689	733
9	39.042	437	479	521	564	607	650	694	737
12.0	39.370	440	482	524	567	610	654	697	741

13

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT		------ TRIM ------ (M)							
(M)	(FT)	1.80	1.90	2.00	2.10	2.20	2.30	2.40	2.50
	(FT)	5.906	6.234	6.562	6.890	7.218	7.546	7.874	8.202
9.0	29.528	407	433	460	488	516	544	573	603
1	29.856	416	444	472	500	529	558	588	618
2	30.184	427	455	484	513	542	573	603	635
3	30.512	438	467	496	526	557	588	620	652
4	30.840	449	479	509	540	571	604	636	669
5	31.168	461	491	522	554	587	620	653	688
6	31.496	473	504	536	569	602	636	671	706
7	31.824	485	517	550	584	618	653	689	725
8	32.152	498	531	565	599	634	670	707	744
9	32.480	511	545	579	615	651	688	725	763
10.0	32.808	525	559	594	631	668	706	744	783
1	33.137	539	575	611	648	686	724	763	803
2	33.465	555	591	627	665	704	743	783	823
3	33.793	570	607	644	683	722	762	803	844
4	34.121	585	623	661	701	741	781	822	864
5	34.449	601	639	678	718	759	800	841	883
6	34.777	616	655	695	735	776	818	860	903
7	35.105	630	670	711	752	794	836	878	921
8	35.433	645	685	726	768	810	853	896	939
9	35.761	658	700	741	783	826	869	912	956
11.0	36.089	672	713	756	798	841	884	928	972
1	36.417	683	725	768	811	854	897	941	986
2	36.745	692	735	778	821	865	909	953	997
3	37.074	701	744	787	831	874	919	963	1008
4	37.402	709	752	795	839	883	928	972	1017
5	37.730	716	759	803	847	891	[illegible]	981	1026
6	38.058	722	766	810	854	898	943	988	1033
7	38.386	728	772	816	860	905	950	995	1040
8	38.714	733	777	821	866	910	955	1000	1046
9	39.042	737	782	826	870	915	960	1005	1051
12.0	39.730	741	785	830	874	919	964	1009	1055

14
(END)

CORRECTION OF DISPLACEMENT FOR TRIM
(UNIT: MT)

DRAFT		------ TRIM ------ (M)					
(M)	(FT)	2.50	2.60	2.70	2.80	2.90	3.00
	(FT)	8.202	8.530	8.858	9.186	9.514	9.843
9.0	29.528	603	633	664	695	727	760
1	29.856	618	649	681	713	746	779
2	30.184	635	667	699	732	766	800
3	30.512	652	685	718	752	787	822
4	30.840	669	703	738	773	808	844
5	31.168	688	722	758	794	830	867
6	31.496	706	742	778	815	852	890
7	31.824	725	762	799	837	875	914
8	32.152	744	782	820	858	898	937
9	32.480	763	802	841	880	920	961
10.0	32.808	783	822	862	902	943	984
1	33.137	803	843	884	925	966	1008
2	33.465	823	864	905	947	989	1031
3	33.793	844	885	927	969	1011	1055
4	34.121	864	906	948	990	1034	1077
5	34.449	883	926	968	1012	1055	1099
6	34.777	903	945	989	1032	1076	1121
7	35.105	921	964	1008	1052	1096	1141
8	35.433	939	983	1027	1071	1116	1161
9	35.761	956	1000	1044	1089	1134	1180
11.0	36.089	972	1017	1061	1106	1152	1197
1	36.417	986	1030	1075	1121	1166	1212
2	36.745	997	1042	1087	1133	1179	1225
3	37.074	1008	1053	1098	1144	1190	1236
4	37.402	1017	1062	1108	1154	1200	1246
5	37.730	1026	1071	1117	1163	1209	1255
6	38.058	1033	1079	1124	1170	1217	1263
7	38.386	1040	1085	1131	1177	1224	1270
8	38.714	1046	1091	1137	1183	1230	1276
9	39.042	1051	1096	1142	1188	1235	1281
12.0	39.370	1055	1100	1146	1192	1239	1285

1230

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL								
A	FEB. 10 1986	OFTS/MES-1197						

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO. 1323	DOCTOR LYKES	NO. 1158	JAMES LYKES
NO. 1324	ALMERIA LYKES	NO. 1159	JOSEPH LYKES
NO. 1325	TILLIE LYKES	NO. 1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS **FINISHED PLAN**

SHIP DESIGN DEPARTMENT
MANAGER

SHIP'S NO. **1325** SHIP'S NAME **TILLIE LYKES**

CO-ORDINATION SECTION
SEC. CHIEF
ASSIST. CHIEF
CHARGE ENG'R
STAFF
DATE (TEL)

DRAFT CORRECTION TABLE

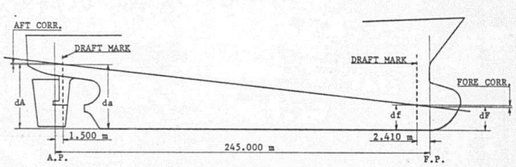
JOB NO. TS1323/24/25 | SCALE | LYKES REF. NO. 291304 | MITSUI DRAWING NO. 1102089
JOBCLASSIF. NO.

(4 SHEETS WITH COVER)

PLAN RECORD			
ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. NO. 1323 AS FINISHED PLAN. MADE	NOV. 10, 1986
		APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	K.A. MA

DRAFT CORRECTION TABLE

(Correction to obtain draft at FP or AP when the draft at marks are known)



FORE AND AFT CORRECTION
(TRIM BY THE STERN)

(UNIT: INCH)

APPARENT TRIM			INCHES 0	1	2	3	4	5	6	7	8	9	10	11	12
FEET	0	FORE	0.0	-0.01	-0.02	-0.03	-0.04	-0.05	-0.06	-0.07	-0.08	-0.09	-0.10	-0.11	-0.12
		AFT	0.0	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.05	0.06	0.06	0.07	0.07
	1	FORE	-0.12	-0.13	-0.14	-0.15	-0.16	-0.17	-0.18	-0.19	-0.20	-0.21	-0.22	-0.23	-0.24
		AFT	0.07	0.08	0.09	0.09	0.10	0.11	0.11	0.12	0.12	0.13	0.14	0.14	0.15
	2	FORE	-0.24	-0.25	-0.26	-0.27	-0.28	-0.29	-0.30	-0.31	-0.32	-0.33	-0.34	-0.35	-0.36
		AFT	0.15	0.16	0.16	0.17	0.17	0.18	0.19	0.19	0.20	0.21	0.21	0.22	0.22
	3	FORE	-0.36	-0.37	-0.38	-0.39	-0.40	-0.41	-0.42	-0.43	-0.44	-0.45	-0.46	-0.47	-0.48
		AFT	0.22	0.23	0.24	0.24	0.25	0.26	0.26	0.27	0.27	0.28	0.29	0.29	0.30
	4	FORE	-0.48	-0.49	-0.50	-0.51	-0.52	-0.53	-0.54	-0.55	-0.56	-0.57	-0.58	-0.59	-0.60
		AFT	0.30	0.30	0.31	0.32	0.32	0.33	0.34	0.34	0.35	0.35	0.36	0.37	0.37
	5	FORE	-0.60	-0.61	-0.62	-0.63	-0.64	-0.65	-0.66	-0.67	-0.68	-0.69	-0.70	-0.71	-0.72
		AFT	0.37	0.38	0.39	0.39	0.40	0.40	0.41	0.42	0.42	0.43	0.44	0.44	0.45
	6	FORE	-0.72	-0.73	-0.74	-0.75	-0.76	-0.77	-0.78	-0.79	-0.80	-0.81	-0.82	-0.83	-0.84
		AFT	0.45	0.45	0.46	0.47	0.47	0.48	0.49	0.49	0.50	0.50	0.51	0.52	0.52
	7	FORE	-0.84	-0.85	-0.86	-0.87	-0.88	-0.89	-0.90	-0.91	-0.92	-0.93	-0.94	-0.95	-0.96
		AFT	0.52	0.53	0.54	0.54	0.55	0.55	0.56	0.57	0.57	0.58	0.58	0.59	0.60
	8	FORE	-0.96	-0.97	-0.98	-0.99	-1.00	-1.01	-1.02	-1.03	-1.04	-1.05	-1.06	-1.07	-1.08
		AFT	0.60	0.60	0.61	0.62	0.62	0.63	0.63	0.64	0.65	0.65	0.66	0.67	0.67
	9	FORE	-1.08	-1.09	-1.10	-1.11	-1.12	-1.13	-1.14	-1.15	-1.16	-1.17	-1.18	-1.19	-1.20
		AFT	0.67	0.68	0.68	0.69	0.70	0.70	0.71	0.72	0.72	0.73	0.73	0.74	0.75

NOTES:-

1. Draft at FP = (Reading at fore draft mark) + (Fore correction)
   Draft at AP = (Reading at aft draft mark) + (Aft correction)

2. When the ship has trimmed by the head, the plus and minus signs are taken vice versa.

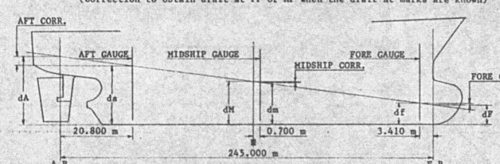
EXAMPLE:-

df (Reading at fore draft mark) = 20 ft 2 in
da (Reading at aft draft mark) = 26 ft 10 in
Apparent trim (da - df) = 6 ft 8 in
Fore correction = -0.80 in
Aft correction = 0.50 in

dF (Draft at FP) = (20 ft 2 in) + (-0.80 in) = 20 ft 1.20 in
dA (Draft at AP) = (26 ft 10 in) + (0.50 in) = 26 ft 10.50 in

DRAFT CORRECTION TABLE FOR PNEUMATIC DRAFT GAUGE

(Correction to obtain draft at FP or AP when the draft at marks are known)



FORE, MIDSHIP AND AFT CORRECTION
(TRIM BY THE STERN)

(UNIT: MM)

APPARENT TRIM			M 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
M	0	FORE	0	-2	-3	-5	-6	-8	-9	-11	-12	-14	-15
		MID.	0	0	1	1	1	2	2	2	3	3	3
		AFT	0	9	19	28	38	47	57	66	75	85	94
	1	FORE	-15	-17	-19	-20	-22	-23	-25	-26	-28	-29	-31
		MID.	3	3	4	4	4	5	5	5	6	6	6
		AFT	94	104	113	122	132	141	151	160	170	179	188
	2	FORE	-31	-32	-34	-36	-37	-39	-40	-42	-43	-45	-46
		MID.	6	7	7	7	8	8	8	9	9	9	10
		AFT	188	198	207	217	226	236	245	254	264	273	283

NOTES:-

1. Draft at FP = (Reading at fore gauge) + (Fore correction)
   Draft at ⊠ = (Reading at midship gauge) + (Midship correction)
   Draft at AP = (Reading at aft gauge) + (Aft correction)

2. When the ship has trimmed by the head, the plus and minus signs are taken vice versa.

EXAMPLE:-

df (Reading at fore gauge) = 9.00 M
dm (Reading at midship gauge) = 9.50 M
da (Reading at aft gauge) = 10.00 M
Apparent trim (da - df) = 1.00 M
Fore correction = -15 MM
Midship correction = 3 MM
Aft correction = 94 MM

dF (Draft at FP) = 9.00 - 0.015 = 8.985 M
dM (Draft at ⊠) = 9.50 + 0.003 = 9.503 M
dA (Draft at AP) = 10.00 + 0.094 = 10.094 M

1231

1/18

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
~~ORIGINAL~~	~~FEB.7.'85~~	—						
ORIGINAL	27 FEB '85	OFFS/MES/120						
REV. A	9 SEP '85	TAH/60						

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO. 1323	DOCTOR LYKES	NO. 1158	JAMES LYKES
NO. 1324	ALMERIA LYKES	NO. 1159	JOSEPH LYKES
NO. 1325	TILLIE LYKES	NO. 1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO.
SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC. (PIPING)
SEC. CHIEF

ARRANGEMENT OF ENGINEER'S CONFERENCE ROOM

DATE (TEL 2240)
JOB NO. TS1323/24/25
SCALE 1/50
LYKES REF. NO. 320701
MITSUI DRAWING NO. 5174006

(1/8 SHEETS WITH COVER)

2/18

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO. 1324 AND S.NO. 1325.	JUNE, 27 '86

DWG. NO. 5174006

3/18

GENERAL NOTE

1. WE HAVE DISCUSSED ARRANGEMENT AND DETAIL OF THIS ROOM WITH Mr. R.S. CAMPBELL AT DESIGN MEETING HELD ON JAN. 23, '85 IN TAMANO.
2.

DWG. NO. 5174006

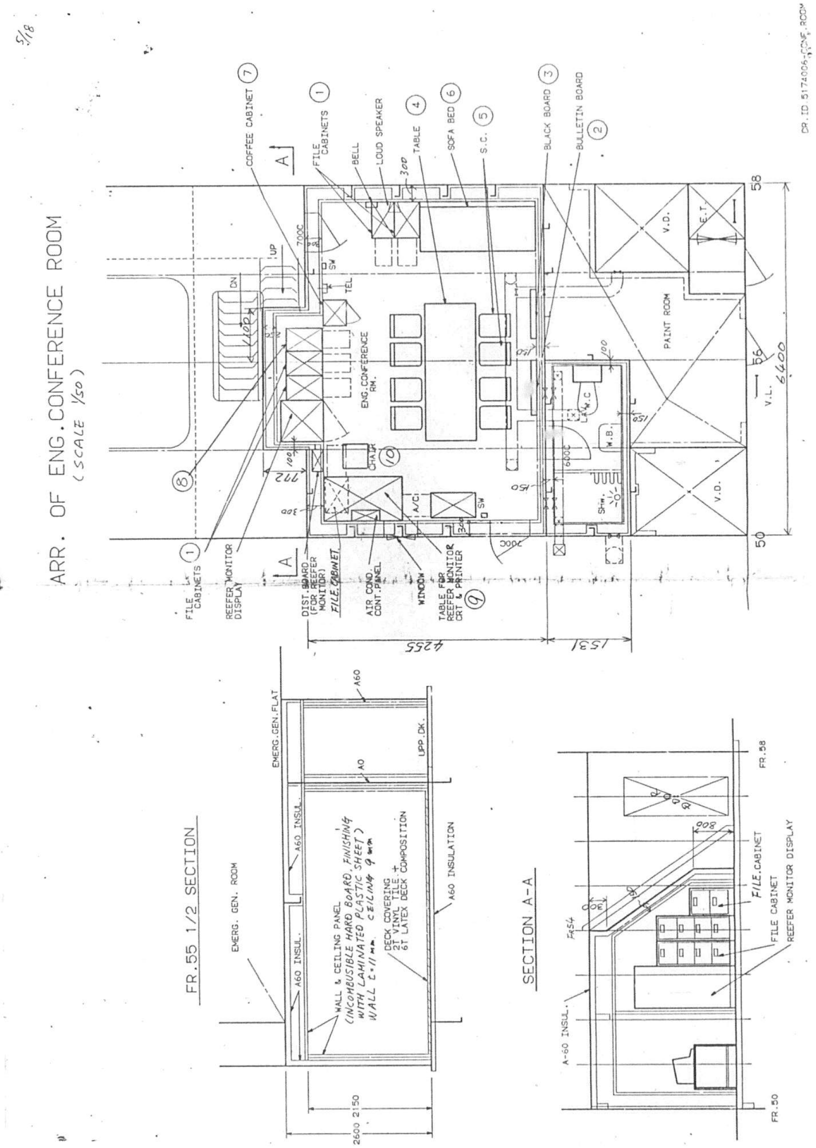
4/18

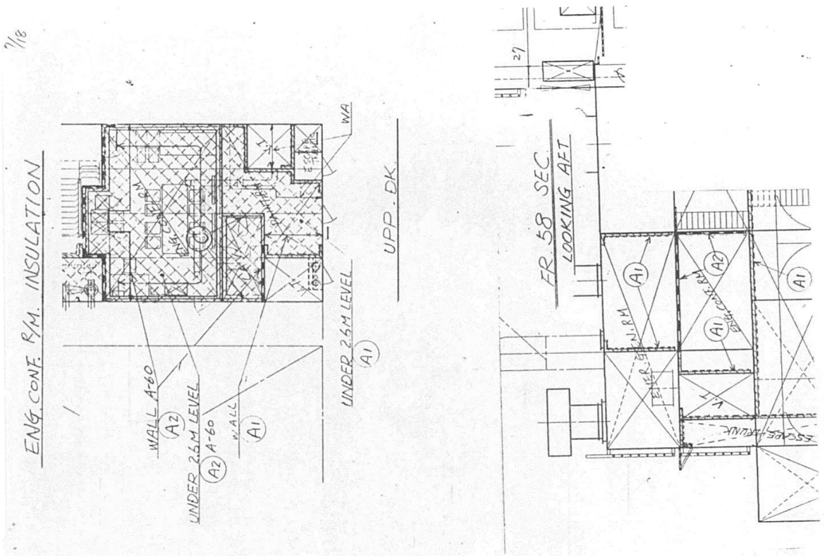
EQUIPMENT LIST

MARK NO.	EQUIPMENT NAME	QUANTITY	FURNISHED	REMARKS
1	FILE CABINET	4	BFE	
2	BULLETIN BOARD	1	"	
3	BLACK BOARD	1	"	900×600 SIZE
4	TABLE	1	"	
5	SMALL CHAIR	8	"	
6	SOFA BED	1	"	
7	COFFEE CABINET	1	BFE	
8	FILE CABINET	1	"	
9	TABLE FOR REFFER MONIT. CRT & PRINTER	1	"	WITH FILE CABINET
10	REV. CHAIR	1	BFE	

三井造船株式会社

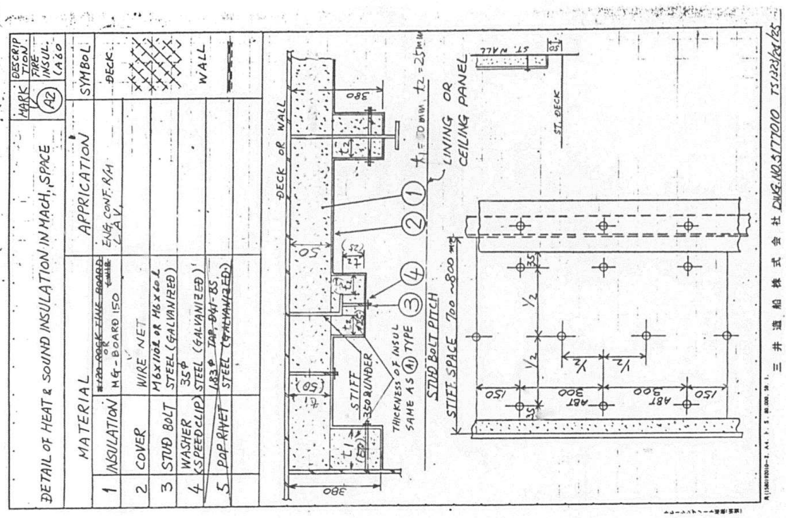
1232



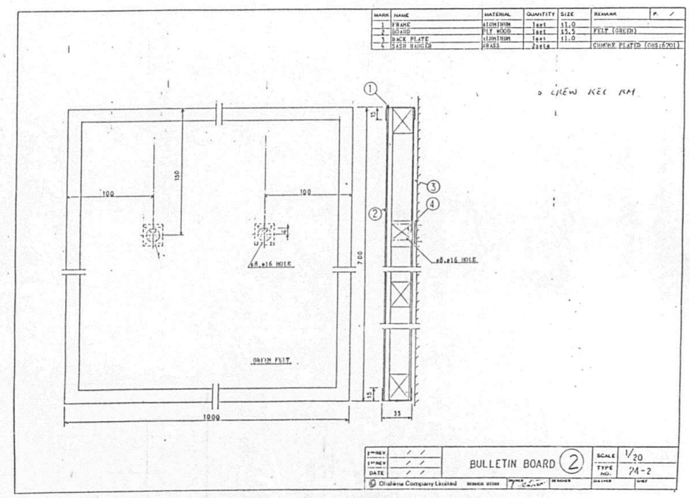


MAKER'S LIST FOR THERMAL ACOUSTIC & FIRE INSULATION

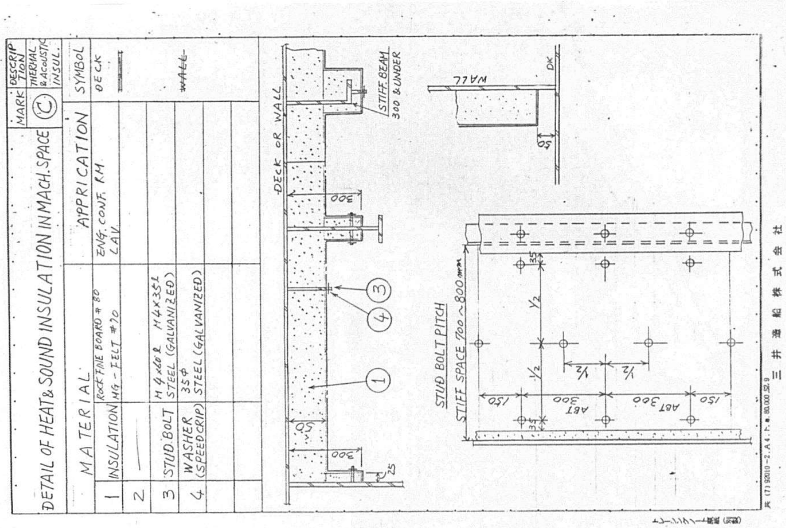
ITEM	APPLICATION	BRAND NAME	MAKER	CERT. NO.
FIRE INSULATION	A-60 FIRE INSULATION	MG-BOARD 150 150	NICHIAS CORPORATION (JAPAN)	USCG : 164.007/57
THERMAL & ACOUSTIC INSULATION	NON-COMBUSIBLE MATERIAL	ROCK-FINE BOARD (# 80)	ASAHI ASBESTOS CO, LTD.	AB : KS/my, T-15-2 PAGE 10 USCG : 164.009/216/0
		MGB FELT(#70)	NICHIAS CORPORATION	AB. KS/my, T-15-2 USCG 164.009/227/0
LINING FOR CEILING & WALL	ASBESTOS FREE BOARD	MARILITE G-PH (ASBESTOS FREE BOARD)	ASAHI ASBESTOS CO, LTD.	AB : KS/mk, T-15-2 PAGE 14 USCG : 164.009/246/0
	LAMINATED PLASTIC SHEET	WALL --- N-63G (LIGHT CLEAM) CEIL. --- N-2G (IVORY WHITE)	NITTO. BOSEKI CO. LTD. (JAPAN)	USCG ; CERT. NO, 164.012/40/10
DECK COVERING	LATEX TYPE DECK COMPOSITION	SEMTEX	KURIYAMA RUBBER CO: LTD. (JAPAN)	
	P.V.C TILE	MATICO "S" 5519 GRAY	TOYO LINOLIUM CO: LTD	



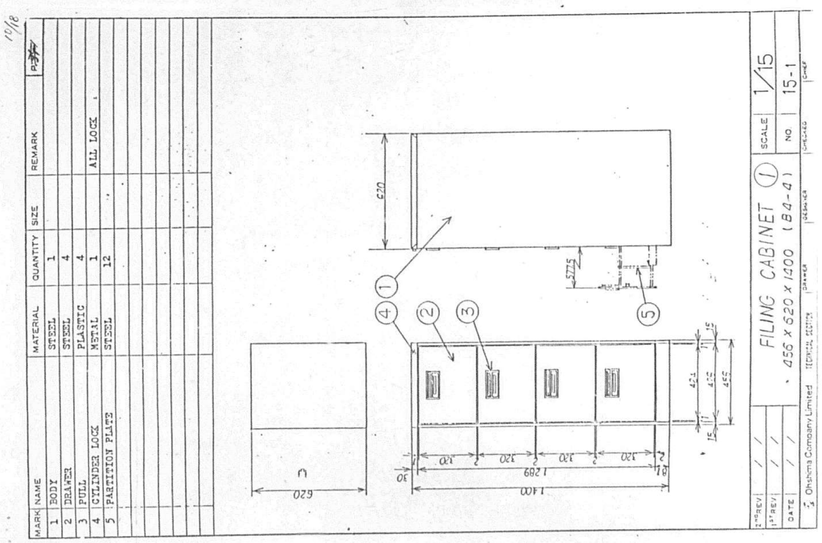
DETAIL OF HEAT & SOUND INSULATION IN MACH. SPACE
MARK
DESCRIPTION
A2
MATERIAL
APPRICATION
SYMBOL
1 INSULATION
MG-BOARD 150
ENG. CONF. RM
LAV.
DECK
2 COVER
WIRE NET
3 STUD BOLT
STEEL (GALVANIZED)
4 WASHER (SPEEDCLIP)
STEEL (GALVANIZED)
5 POP RIVET
WALL
DECK OR WALL
LINING OR CEILING PANEL
STIFF 350 & UNDER
THICKNESS OF INSUL SAME AS (A) TYPE
STUD BOLT PITCH
STIFF SPACE 700~800
ST. WALL
ST. DECK
三井造船株式会社



MARK
NAME
MATERIAL
QUANTITY
SIZE
REMARK
GREEN FELT
BULLETIN BOARD ②
SCALE 1/20
TYPE NO. 24-2
Ohshima Company Limited
1000
700

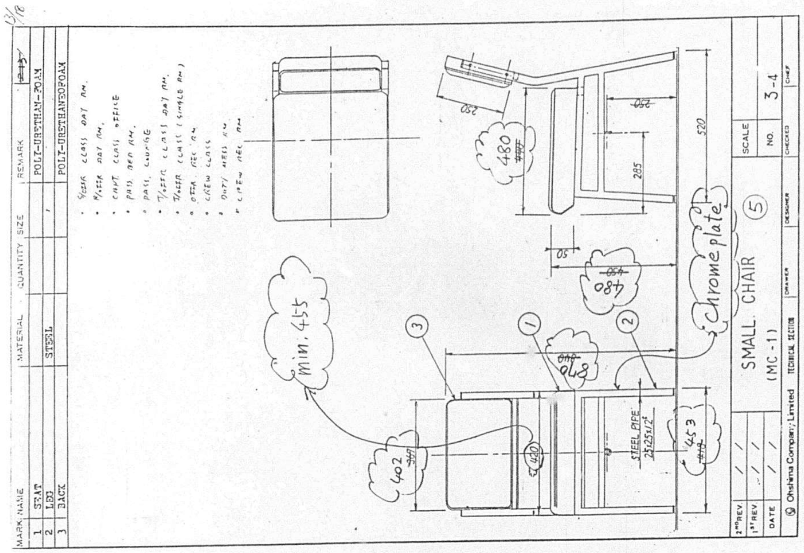


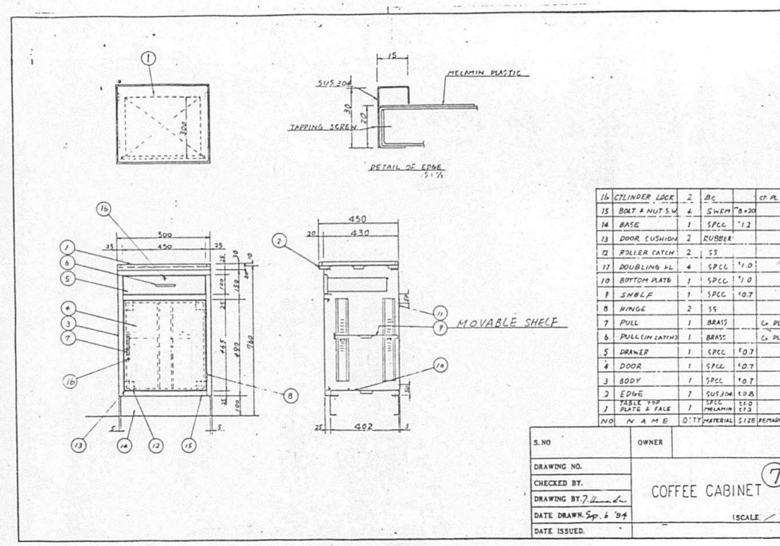
DETAIL OF HEAT & SOUND INSULATION IN MACH. SPACE
MARK
DESCRIPTION
C
THERMAL & ACOUSTIC INSUL.
MATERIAL
APPRICATION
SYMBOL
1 INSULATION
ROCK FINE BOARD # 80
MG-FELT # 20
ENG. CONF. RM
LAV.
DECK
2
3 STUD BOLT
STEEL (GALVANIZED)
4 WASHER (SPEEDCRIP)
STEEL (GALVANIZED)
WALL
DECK OR WALL
STIFF. BEAM 300 & UNDER
STUD BOLT PITCH
STIFF SPACE 700~800
三井造船株式会社

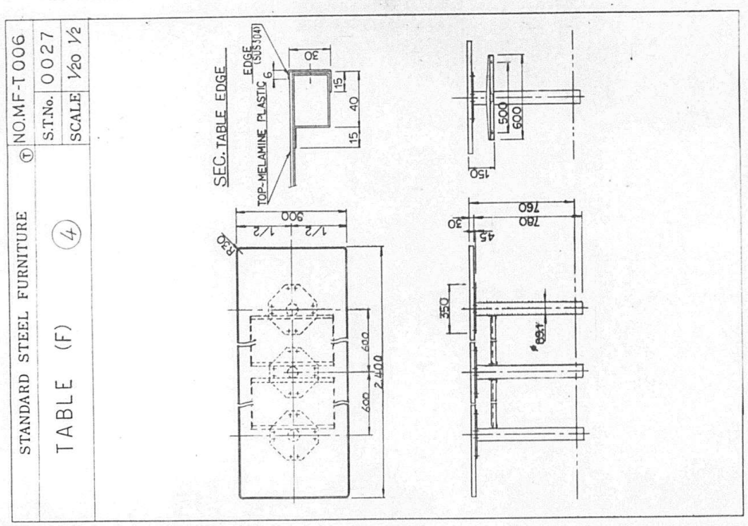


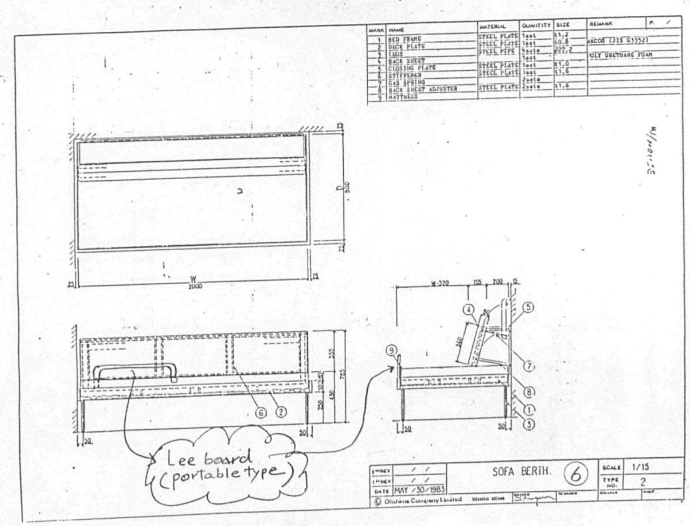
MARK
NAME
MATERIAL
QUANTITY
SIZE
REMARK
1 BODY STEEL 1
2 DRAWER STEEL 4
3 PULL PLASTIC 4
4 CYLINDER LOCK METAL 1 ALL LOCK
5 PARTITION PLATE STEEL 12
FILING CABINET ①
456 x 620 x 1400 (B4-4)
SCALE 1/15
NO. 15-1
Ohshima Company Limited
620
1400
1289

1234

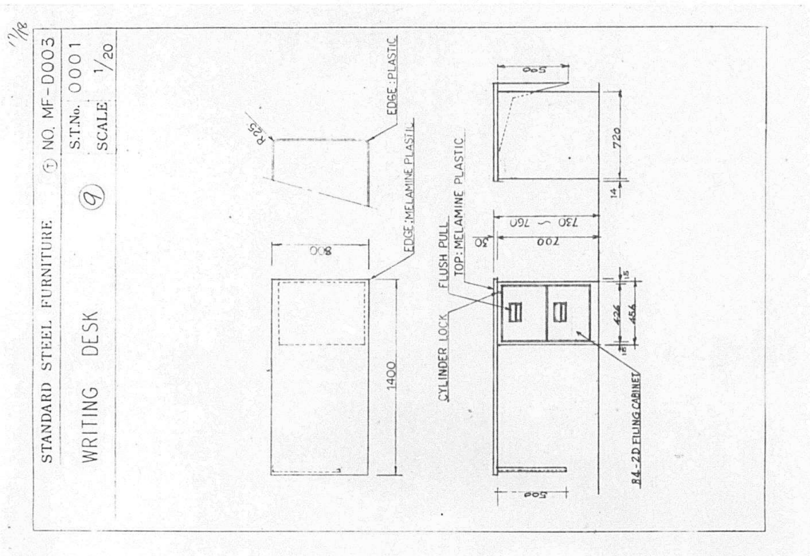

SMALL CHAIR
(MC-1)
Chrome plate
min. 455
STEEL PIPE

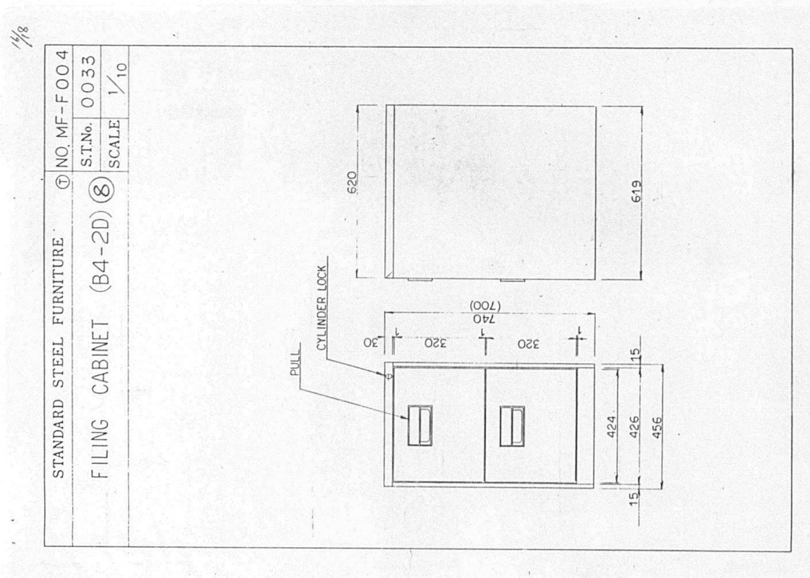

COFFEE CABINET
MOVABLE SHELF
DETAIL OF EDGE
MELAMIN PLASTIC
TAPPING SCREW

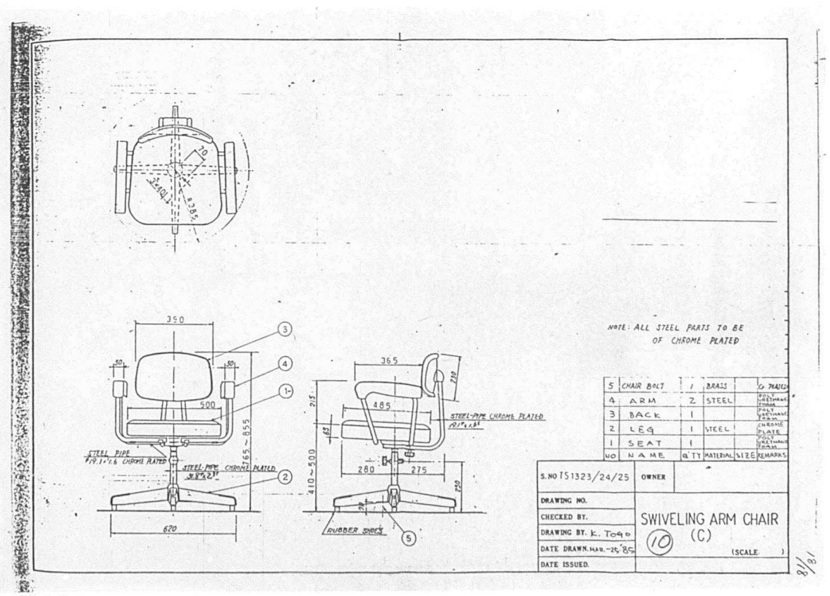

STANDARD STEEL FURNITURE
TABLE (F)
NO.MF-T006
S.T.No. 0027
SCALE 1/20 1/2
SEC.TABLE EDGE
TOP-MELAMINE PLASTIC
EDGE (SUS304)


SOFA BERTH.
Lee board
(portable type)
MAY /30/1983

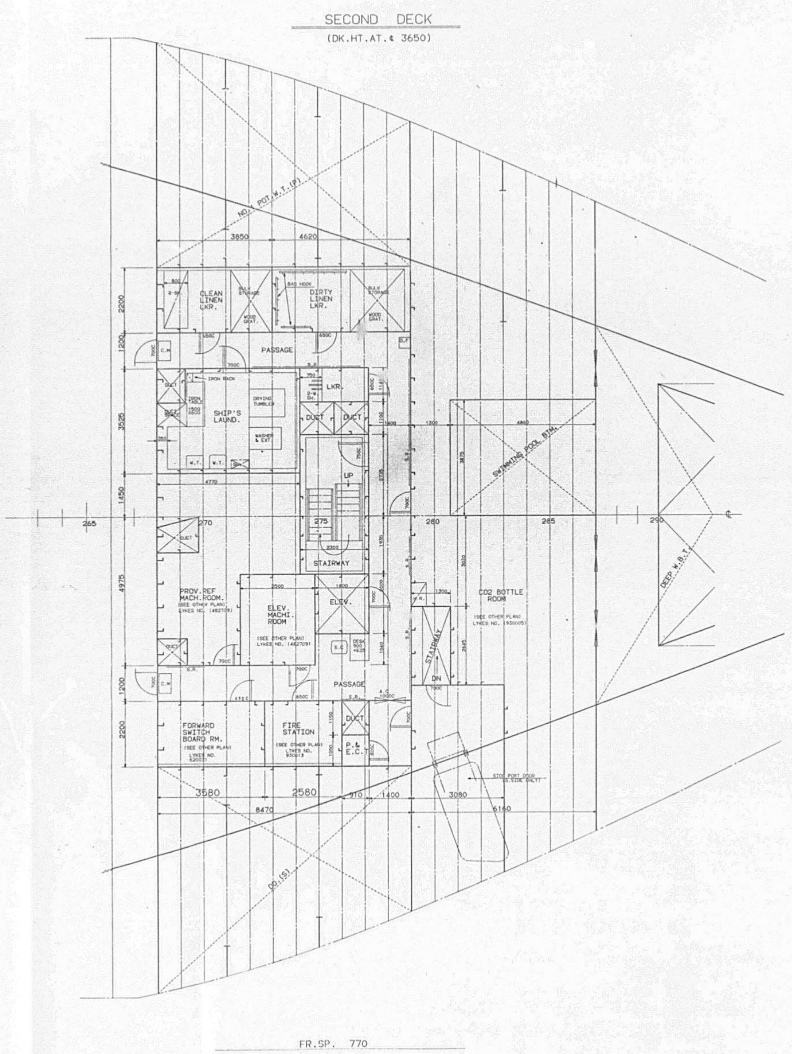
1235


STANDARD STEEL FURNITURE
WRITING DESK
NO. MF-D003
S.T.No. 0001
SCALE 1/20
EDGE: PLASTIC
EDGE: MELAMINE PLASTIC
FLUSH PULL
TOP: MELAMINE PLASTIC
CYLINDER LOCK
B4-2D FILING CABINET


STANDARD STEEL FURNITURE
FILING CABINET (B4-2D)
NO. MF-F004
S.T.No. 0033
SCALE 1/10
PULL
CYLINDER LOCK


NOTE: ALL STEEL PARTS TO BE OF CHROME PLATED
SWIVELING ARM CHAIR (C)
RUBBER SHOES

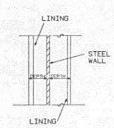
1236



STANDARD ABBREVIATIONS

A.C.	ARM CHAIR	I.D.	INSTRUMENT DISINFECTION
A.O.	ARCH OPENING	INST.LKR.	INSTRUMENT LOCKER
B.B.	BINOCULAR BOX		
B.& D.	BED WITH DRAWER	K.L.	KEY LOCKER
B.C.	BOOK CASE	K.T.	KITCHEN TABLE
B.R.	BOOK RACK		
B.S.	BOOK SHELF	LKR.	LOCKER
BUT.B.	BUTCHER BLOCK	L.P.	LIGHT PANEL
		MED.LKR.	MEDICINE LKR
C.D.	CHEST OF DRAWER	MIR.	MIRROR
C.L.	CLEAN TOOL LOCKER	M.SLIC.	MEAT SLICER
C.M.	COIR MAT	M.T.	MESS TABLE
C.T.	CARD TABLE	MIX.	MIXER
COFF.M.	COFFEE MAKER	M.W.OVEN	MICROWAVE OVEN
C.V.S.	CLEAR VIEW SCREEN		
C.L.L.	CLEAN LINEN LOCKER	N.T.	NIGHT TABLE
C.G.L.	CLEAN GEAR LOCKER		
		P.	PILLAR
D.F.	DRINKING FOUNTAIN	P.& E.C.	PIPE & ELECTRIC CABLE
DISP.	DISPOSER	P.C.	PILOT CHAIR
D.M.	DOOR MAT	P.LKR.	PLAN LOCKER
DRESS.	DRESSER	P.P.	POWER PANEL
D.T.	DRESSING TABLE		
		RICE B.	RICE BOILER
E.C.	EASY CHAIR	R.A.C.	REVOLVING ARM CHAIR
E.H.	ELECTRIC HEATER	R.S.C.	REVOLVING SMALL CHAIR
E.H.P.	ELECTRIC HOT PLATE	R.C	RECLINING ARM CHAIR
E.REF.	ELECTRIC REFRIGERATOR		
E.T.	END TABLE	S.B.	SIDE BOARD
EXAM.T.	EXAMINING TABLE	S.C.	SMALL CHAIR
EXT.	EXTRACTOR	SH	SHELF
E.W.	ELECTRIC WASHING MACHINE	SHW.	SHOWER
		S.R.	STORM RAIL
(F)	FASTENER FOR CHAIR & TABLE	S.W.	STAIRWAY
F.C.	FILING CABINET	SERV.W.	SERVICE WINDOW
F.T.	FOLDING TABLE		
F.W.	FIXED WINDOW	T.	TABLE
		T.C.	TOILET CABINET WITH MIRROR
G.P.	GALLEY PANEL		
GRAT.	GRATING	T.R.	TOILET RACK
G.DISP.	GARBAGE DISPOSER		
		W.B.	WASH BASIN
(H)	HEAD END OF BED	W.BOIL.	WATER BOILER
H.R.	HOSE RECESS	W.C.	WATER CLOSET
H.W.	HINGED WINDOW	WASH.M	WASHING MACHINE
HWB	HAND WASH BASIN	W.R.	WARDROBE
H.SLIC.	HAM SLICER	W.T.	WASH TUB

NOTE:
LINING DEPTH



PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN	APR/1/85
		MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.
ORIGINAL	OCT/26/84	DISCUSSION MEMO				
A	DEC/5/84	DFTS/MES/007				
B	JAN/23/85	DISCUSSION MEMO				
C	APRIL/8/85	DISCUSSION MEMO	JUN/26/85	M-00628	APRIL/10/85	T-8-2
D	JULY/22/85	DFTS/MES/766			AUG/5/85	T-8-2

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

SHIPYARD AND SHIP'S NO.	
MITSUI TAMANO	MITSUBISHI KOBE
NO.1323/1324/1325	NO.1158/1159/1164

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

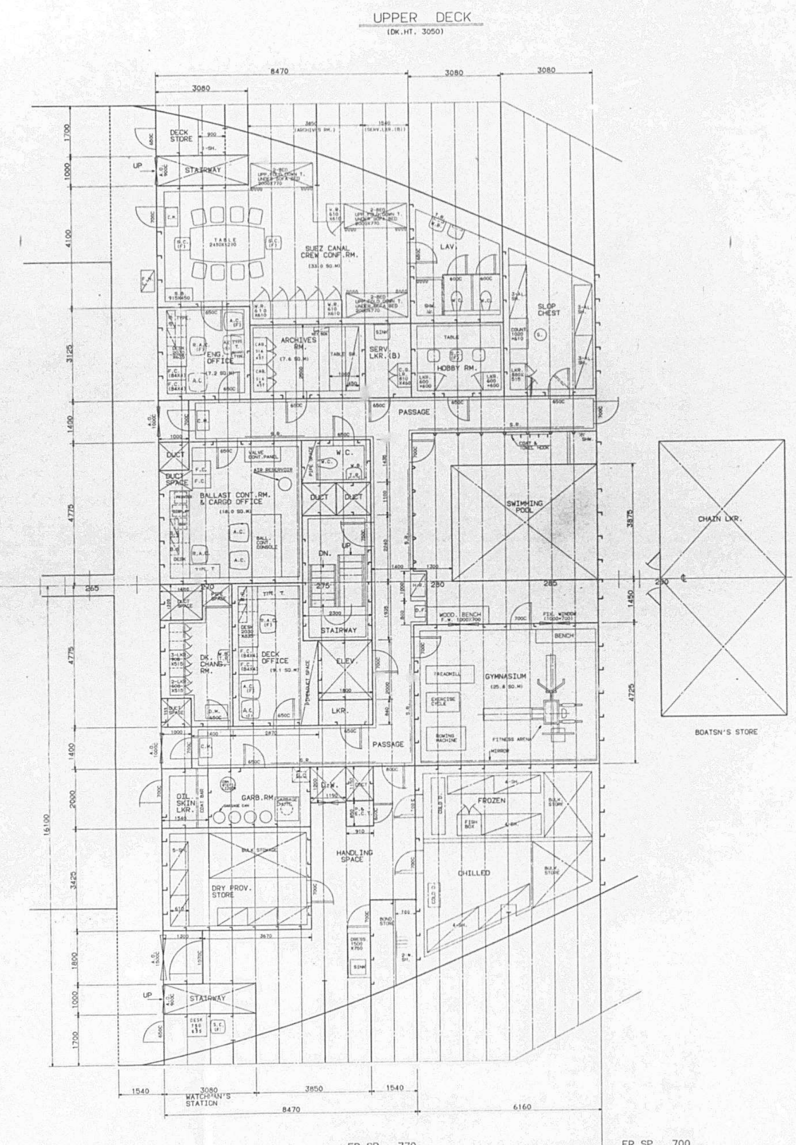
SHIP DESIGN DEPARTMENT — SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

諸室配置
ACCOMMODATION PLAN
(SECOND DECK) 1/8

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
JOBCLASSIF.NO. 011	1/50	330001	4111001

1237

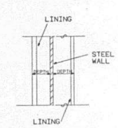
UPPER DECK
(DK.HT. 3050)



STANDARD ABBREVIATIONS

A.C.	ARM CHAIR	I.D.	INSTRUMENT DISINFECTION
A.O.	ARCH OPENING	INST.LKR.	INSTRUMENT LOCKER
B.B.	BINOCULAR BOX		
B.& D.	BED WITH DRAWER	K.L.	KEY LOCKER
B.C.	BOOK CASE	K.T.	KITCHEN TABLE
B.R.	BOOK RACK		
B.S.	BOOK SHELF	LKR.	LOCKER
BUT.B.	BUTCHER BLOCK	L.P.	LIGHT PANEL
C.D.	CHEST OF DRAWER	MED.LKR.	MEDICINE LKR
C.L.	CLEAN TOOL LOCKER	MIR.	MIRROR
C.M.	COIR MAT	M.SLIC.	MEAT SLICER
C.T.	CARD TABLE	M.T.	MESS TABLE
COFF.M.	COFFEE MAKER	MIX.	MIXER
C.V.S.	CLEAR VIEW SCREEN	M.W.OVEN	MICROWAVE OVEN
C.L.L.	CLEAN LINEN LOCKER		
C.G.L.	CLEAN GEAR LOCKER	N.T.	NIGHT TABLE
D.F.	DRINKING FOUNTAIN	P.	PILLAR
DISP.	DISPOSER	P.& E.C.	PIPE & ELECTRIC CABLE
D.M.	DOOR MAT	P.C.	PILOT CHAIR
DRESS.	DRESSER	P.LKR.	PLAN LOCKER
D.T.	DRESSING TABLE	P.P.	POWER PANEL
DRY M.	DRYING MACHINE	RICE B.	RICE BOILER
E.C.	EASY CHAIR	R.A.C.	REVOLVING ARM CHAIR
E.H.	ELECTRIC HEATER	R.S.C.	REVOLVING SMALL CHAIR
E.H.P.	ELECTRIC HOT PLATE	R.C	RECLINING ARM CHAIR
E.REF.	ELECTRIC REFRIGERATOR		
E.T.	END TABLE	S.B.	SIDE BOARD
EXAM.T.	EXAMINING TABLE	S.C.	SMALL CHAIR
EXT.	EXTRACTOR	SH.	SHELF
E.W.	ELECTRIC WASHING MACHINE	SHW.	SHOWER
		S.R.	STORM RAIL
(F)	FASTENER FOR CHAIR & TABLE	S.W.	STAIRWAY
F.C.	FILING CABINET	SERV.W.	SERVICE WINDOW
F.T.	FOLDING TABLE		
F.W.	FIXED WINDOW	T.	TABLE
		T.C.	TOILET CABINET WITH MIRROR
G.P.	GALLEY PANEL	T.R.	TOILET RACK
GRAT.	GRATING		
G.DISP.	GARBAGE DISPOSER	W.B.	WASH BASIN
Ⓗ	HEAD END OF BED	W.BOIL.	WATER BOILER
H.R.	HOSE RECESS	W.C.	WATER CLOSET
H.W.	HINGED WINDOW	WASH.M	WASHING MACHINE
HWB	HAND WASH BASIN	W.R.	WARDROBE
H.SLIC.	HAM SLICER	W.T.	WASH TUB

NOTE:
LINING DEPTH



PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN	APR/1/85
		MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	[illegible]

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		USCG		ABS	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	OCT/26/84	DISCUSSION MEMO				
A	DEC/5/84	DFTS/MES/007				
B	JAN/23/85	DISCUSSION MEMO				
C	APRIL/8/85	DISCUSSION MEMO	JUN/26/85	M-CO628	APRIL/10/85	T-8-2
D	JULY/22/85	DFTS/MES/766			AUG/5/85	T-8-2

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

SHIPYARD AND SHIP'S NO.
MITSUI TAMANO NO.1323/1324/1325
MITSUBISHI KOBE NO.1158/1159/1164

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — MANAGER
OUTFITTING DESIGN SECT — SEC.CHIEF / ASSIST.CHIEF / CHARGED / STAFF
DATE (TEL 2235)

SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

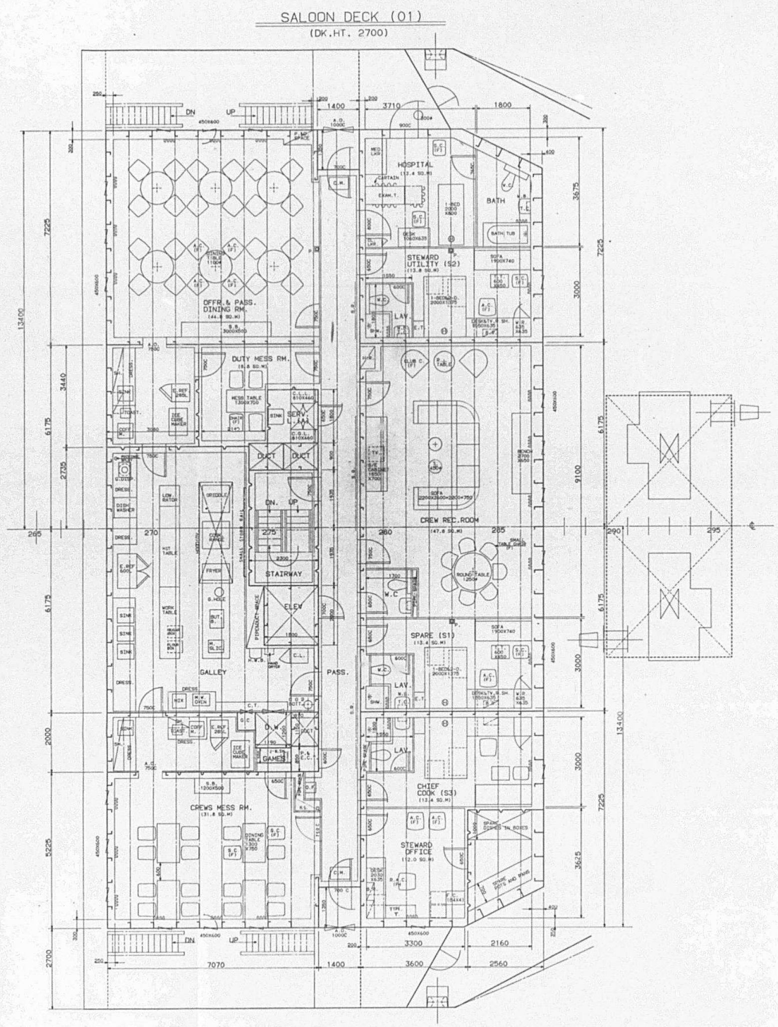
諸室配置
ACCOMMODATION PLAN
(UPPER DECK) 2/8

JOB NO. — JOBCLASSIF.NO. D11 — SCALE 1/50 — LYKES REF. NO. 330002 — MITSUI DRAWING NO. 4111002

1238

SALOON DECK (01)

(DK.HT. 2700)

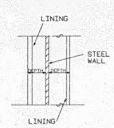


FR.SP. 770

STANDARD ABBREVIATION

A.C.	ARM CHAIR	I.D.	INSTRUMENT DISINFECTION
A.O.	ARCH OPENING	INST.LKR.	INSTRUMENT LOCKER
B.B.	BINOCULAR BOX		
B.& D.	BED WITH DRAWER	K.L.	KEY LOCKER
B.C.	BOOK CASE	K.T.	KITCHEN TABLE
B.R.	BOOK RACK		
B.S.	BOOK SHELF	LKR.	LOCKER
BUT.B.	BUTCHER BLOCK	L.P.	LIGHT PANEL
C.D.	CHEST OF DRAWER	MED.LKR.	MEDICINE LKR
C.L.	CLEAN TOOL LOCKER	MIR.	MIRROR
C.M.	COIR MAT	M.SLIC.	MEAT SLICER
C.T.	CARD TABLE	M.T.	MESS TABLE
COFF.M.	COFFEE MAKER	MIX.	MIXER
C.V.S.	CLEAR VIEW SCREEN	M.W.OVEN	MICROWAVE OVEN
C.L.L.	CLEAN LINEN LOCKER		
C.G.L.	CLEAN GEAR LOCKER	N.T.	NIGHT TABLE
D.F.	DRINKING FOUNTAIN	P.	PILLAR
DISP.	DISPOSER	P.& E.C.	PIPE & ELECTRIC CABLE
D.M.	DOOR MAT	P.C.	PILOT CHAIR
DRESS.	DRESSER	P.LKR.	PLAN LOCKER
D.T.	DRESSING TABLE	P.P.	POWER PANEL
DRY M.	DRYING MACHINE		
		RICE B.	RICE BOILER
E.C.	EASY CHAIR	R.A.C.	REVOLVING ARM CHAIR
E.H.	ELECTRIC HEATER	R.S.C.	REVOLVING SMALL CHAIR
E.H.P.	ELECTRIC HOT PLATE	R.C	RECLINING ARM CHAIR
E.REF.	ELECTRIC REFRIGERATOR		
E.T.	END TABLE	S.B.	SIDE BOARD
EXAM.T.	EXAMINING TABLE	S.C.	SMALL CHAIR
EXT.	EXTRACTOR	SH.	SHELF
E.W.	ELECTRIC WASHING MACHINE	SHW.	SHOWER
		S.R.	STORM RAIL
(F)	FASTENER FOR CHIR & TABLE	S.W.	STAIRWAY
F.C.	FILING CABINET	SERV.W.	SERVICE WINDOW
F.T.	FOLDING TABLE		
F.W.	FIXED WINDOW	T.	TABLE
		T.C.	TOILET CABINET WITH MIRROR
G.P.	GALLEY PANEL		
GRAT.	GRATING	T.R.	TOILET RACK
G.DISP.	GARBAGE DISPOSER		
		W.B.	WASH BASIN
(H)	HEAD END OF BED	W.BOIL.	WATER BOILER
		W.C.	WATER CLOSET
H.R.	HOSE RECESS	WASH.M	WASHING MACHINE
H.W.	HINGED WINDOW	W.R.	WARDROBE
HWB	HAND WASH BASIN	W.T.	WASH TUB
H.SLIC.	HAM SLICER		

NOTE:
LINING DEPTH



PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN	APR/1/86
		MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		USCG		ABS	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	OCT/26/84	DISCUSSION MEMO				
A	DEC/5/84	OFTS/MES/007				
B	JAN/23/85	DISCUSSION MEMO				
C	APRIL/8/85	DISCUSSION MEMO	JUN/26/85	M-00628	APRIL/10/85	T-8-2
D	JULY/22/85	OFTS/MES/766			AUG/5/85	T-8-2

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

SHIPYARD AND SHIP'S NO.

MITSUI TAMANO	MITSUBISHI KOBE
NO.1323/1324/1325	NO.1158/1159/1164

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — MANAGER
OUTFITTING DESIGN SECT — SEC.CHIEF — ASSIST — CHARGE ENG'R — STAFF — DATE (TEL 3235)

SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

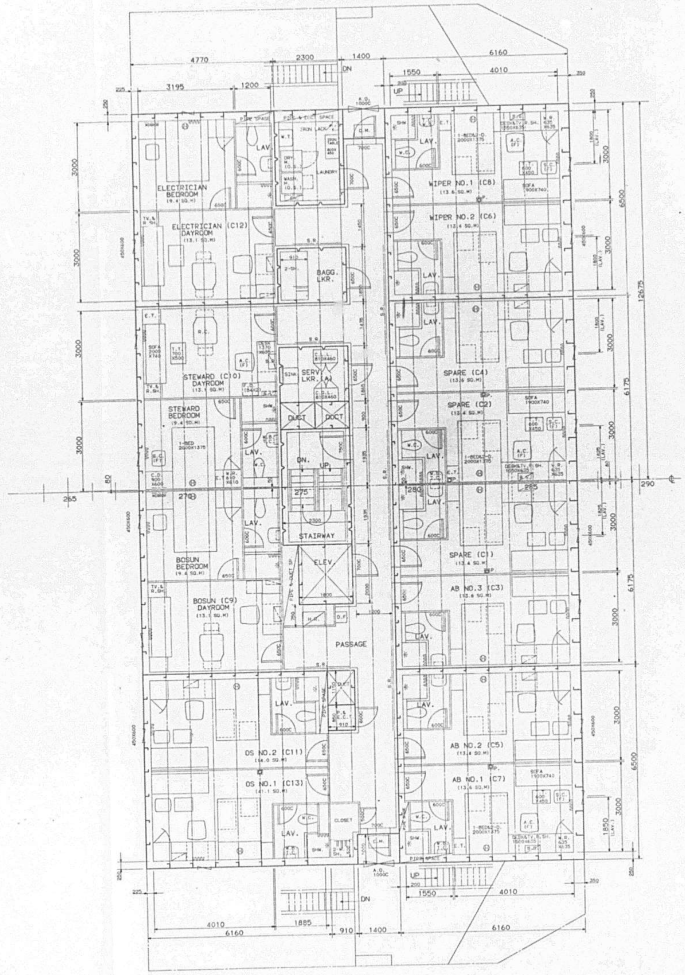
諸室配置
ACCOMMODATION PLAN
(SALOON DECK (01)) 3/8

JOB NO. / JOBCLASSIF.NO. 011	SCALE 1/50	LYKES REF. NO. 330003	MITSUI DRAWING NO. 4111003

1239

CREW DECK (02)

(DK.HT. 2700)

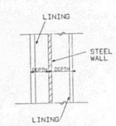


FR.SP. 770

STANDARD ABBREVIATIONS

Abbr.	Meaning	Abbr.	Meaning
A.C.	ARM CHAIR	I.D.	INSTRUMENT DISINFECTION
A.O.	ARCH OPENING	INST.LKR.	INSTRUMENT LOCKER
B.B.	BINOCULAR BOX	K.L.	KEY LOCKER
B.& D.	BED WITH DRAWER	K.T.	KITCHEN TABLE
B.C.	BOOK CASE	LKR.	LOCKER
B.R.	BOOK RACK	L.P.	LIGHT PANEL
B.S.	BOOK SHELF	MED.LKR.	MEDICINE LKR
BUT.B.	BUTCHER BLOCK	MIR.	MIRROR
C.D.	CHEST OF DRAWER	M.SLIC.	MEAT SLICER
C.L.	CLEAN TOOL LOCKER	M.T.	MESS TABLE
C.M.	COIR MAT	MIX.	MIXER
C.T.	CARD TABLE	M.W.OVEN	MICROWAVE OVEN
COFF.M.	COFFEE MAKER	N.T.	NIGHT TABLE
C.V.S.	CLEAR VIEW SCREEN	P.	PILLAR
C.L.L.	CLEAN LINEN LOCKER	P.& E.C.	PIPE & ELECTRIC CABLE
C.G.L.	CLEAN GEAR LOCKER	P.C.	PILOT CHAIR
D.F.	DRINKING FOUNTAIN	P.LKR.	PLAN LOCKER
DISP.	DISPOSER	P.P.	POWER PANEL
D.M.	DOOR MAT	RICE B.	RICE BOILER
DRESS.	DRESSER	R.A.C.	REVOLVING ARM CHAIR
D.T.	DRESSING TABLE	R.S.C.	REVOLVING SMALL CHAIR
DRY M.	DRYING MACHINE	R.C	RECLINING ARM CHAIR
E.C.	EASY CHAIR	S.B.	SIDE BOARD
E.H.	ELECTRIC HEATER	S.C.	SMALL CHAIR
E.H.P.	ELECTRIC HOT PLATE	SH.	SHELF
E.REF.	ELECTRIC REFRIGERATOR	SHW.	SHOWER
E.T.	END TABLE	S.R.	STORM RAIL
EXAM.T.	EXAMINING TABLE	S.W.	STAIRWAY
EXT.	EXTRACTOR	SERV.W.	SERVICE WINDOW
E.W.	ELECTRIC WASHING MACHINE	T.	TABLE
(F)	FASTENER FOR CHAIR & TABLE	T.C.	TOILET CABINET WITH MIRROR
F.C.	FILING CABINET	T.R.	TOILET RACK
F.T.	FOLDING TABLE	W.B.	WASH BASIN
F.W.	FIXED WINDOW	W.BOIL.	WATER BOILER
G.P.	GALLEY PANEL	W.C.	WATER CLOSET
GRAT.	GRATING	WASH.M	WASHING MACHINE
G.DISP.	GARBAGE DISPOSER	W.R.	WARDROBE
Ⓗ	HEAD END OF BED	W.T.	WASH TUB
H.R.	HOSE RECESS		
H.W.	HINGED WINDOW		
HWB	HAND WASH BASIN		
H.SLIC.	HAM SLICER		

NOTE:
LINING DEPTH



PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN. MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	APR/1/88

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.
ORIGINAL	OCT/26/84	DISCUSSION MEMO				
A	DEC/5/84	DFTS/MES/007				
B	JAN/23/85	DISCUSSION MEMO				
C	APRIL/8/85	DISCUSSION MEMO	JUN/25/85	M-00E28	APRIL/10/85	T-8-2
D	JULY/22/85	DFTS/MES/766			AUG/5/85	T-8-2

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

SHIPYARD AND SHIP'S NO.

MITSUI TAMANO	MITSUBISHI KOBE
NO.1323/1324/1325	NO.1158/1159/1164

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — MANAGER
OUTFITTING DESIGN SECT — SEC.CHIEF / ASSIS.CHIEF / CHARGE ENG'R / STAFF
DATE (TEL 2935)

SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

諸室配置
ACCOMMODATION PLAN

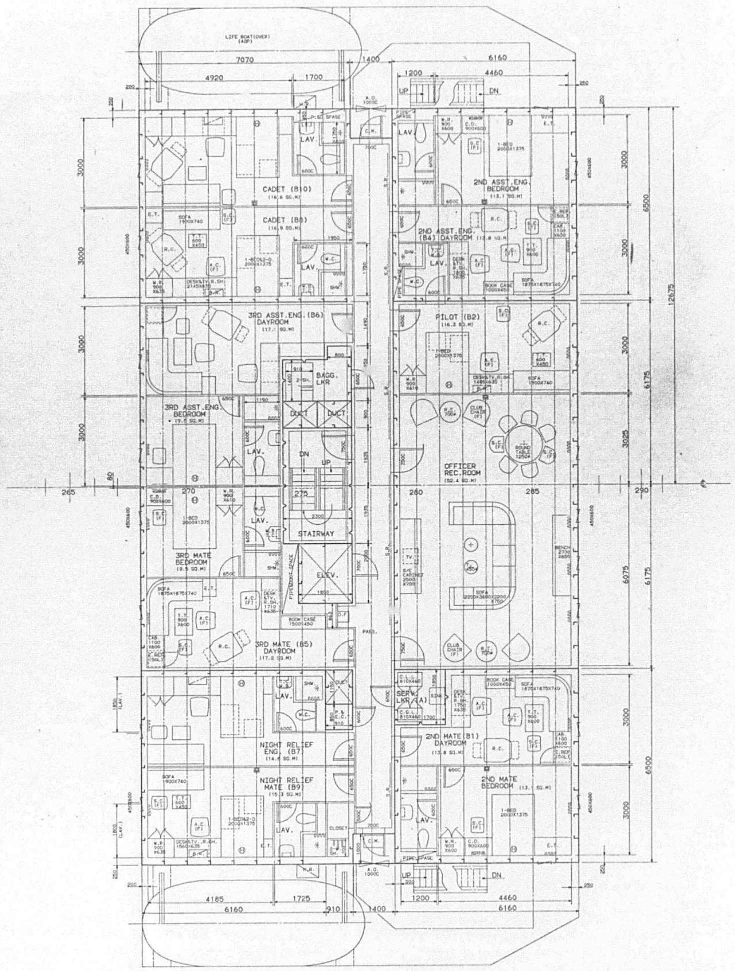
(CREW DECK(02)) 4/8

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
JOBCLASSIF.NO. 011	1/50	330004	4111004

1240

BOAT DECK (03)

(DK.HT. 2700)

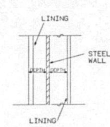


FR.SP. 770

STANDARD ABBREVIATIONS

A.C.	ARM CHAIR	I.D.	INSTRUMENT DISINFECTION
A.O.	ARCH OPENING	INST.LKR.	INSTRUMENT LOCKER
B.B.	BINOCULAR BOX		
B.& D.	BED WITH DRAWER	K.L.	KEY LOCKER
B.C.	BOOK CASE	K.T.	KITCHEN TABLE
B.R.	BOOK RACK		
B.S.	BOOK SHELF	LKR.	LOCKER
BUT.B.	BUTCHER BLOCK	L.P.	LIGHT PANEL
		MED.LKR.	MEDICINE LKR
C.D.	CHEST OF DRAWER	MIR.	MIRROR
C.L.	CLEAN TOOL LOCKER	M.SLIC.	MEAT SLICER
C.M.	COIR MAT	M.T.	MESS TABLE
C.T.	CARD TABLE	MIX.	MIXER
COFF.M.	COFFEE MAKER	M.W OVEN	MICROWAVE OVEN
C.V.S.	CLEAR VIEW SCREEN		
C.L.L.	CLEAN LINEN LOCKER	N.T.	NIGHT TABLE
C.G.L.	CLEAN GEAR LOCKER		
		P.	PILLAR
D.F.	DRINKING FOUNTAIN	P.& E.C.	PIPE & ELECTRIC CABLE
DISP.	DISPOSER	P.C.	PILOT CHAIR
D.M.	DOOR MAT	P.LKR.	PLAN LOCKER
DRESS.	DRESSER	P.P.	POWER PANEL
D.T.	DRESSING TABLE		
DRY M.	DRYING MACHINE	RICE B.	RICE BOILER
		R.A.C.	REVOLVING ARM CHAIR
E.C.	EASY CHAIR	R.S.C.	REVOLVING SMALL CHAIR
E.H.	ELECTRIC HEATER	R.C	RECLINING ARM CHAIR
E.H.P.	ELECTRIC HOT PLATE		
E.REF.	ELECTRIC REFRIGERATOR	S.B.	SIDE BOARD
E.T.	END TABLE	S.C.	SMALL CHAIR
EXAM.T.	EXAMINING TABLE	SH.	SHELF
EXT.	EXTRACTOR	SHW.	SHOWER
E.W.	ELECTRIC WASHING MACHINE	S.R.	STORM RAIL
		S.W.	STAIRWAY
(F)	FASTENER FOR CHAIR & TABLE	SERV.W.	SERVICE WINDOW
F.C.	FILING CABINET		
F.T.	FOLDING TABLE	T.	TABLE
F.W.	FIXED WINDOW	T.C.	TOILET CABINET WITH MIRROR
G.P.	GALLEY PANEL	T.R.	TOILET RACK
GRAT.	GRATING		
G.DISP.	GARBAGE DISPOSER	W.B.	WASH BASIN
		W.BOIL.	WATER BOILER
(H)	HEAD END OF BED	W.C.	WATER CLOSET
H.R.	HOSE RECESS	WASH.M	WASHING MACHINE
H.W.	HINGED WINDOW	W.R.	WARDROBE
HWB	HAND WASH BASIN	W.T.	WASH TUB
H.SLIC.	HAM SLICER		

NOTE:
LINING DEPTH



PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN	APR/1/86
		MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		USCG		ABS	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	OCT/26/84	DISCUSSION MEMO				
A	DEC/5/84	OFT&MES/007				
B	JAN/23/85	DISCUSSION MEMO				
C	APRIL/8/85	DISCUSSION MEMO	JUN/26/85	M-00628	APRIL/10/85	T-8-2
D	JULY/22/85	OFTS/MES/766			AUG/5/85	T-8-2

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

SHIPYARD AND SHIP'S NO.
MITSUI TAMANO NO.1323/1324/1325 | MITSUBISHI KOBE NO.1158/1159/1164

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
OUTFITTING DESIGN SECT SEC.CHIEF
DATE (TEL 2235)

SHIP'S NO. NO.1325 | SHIP'S NAME TILLIE LYKES

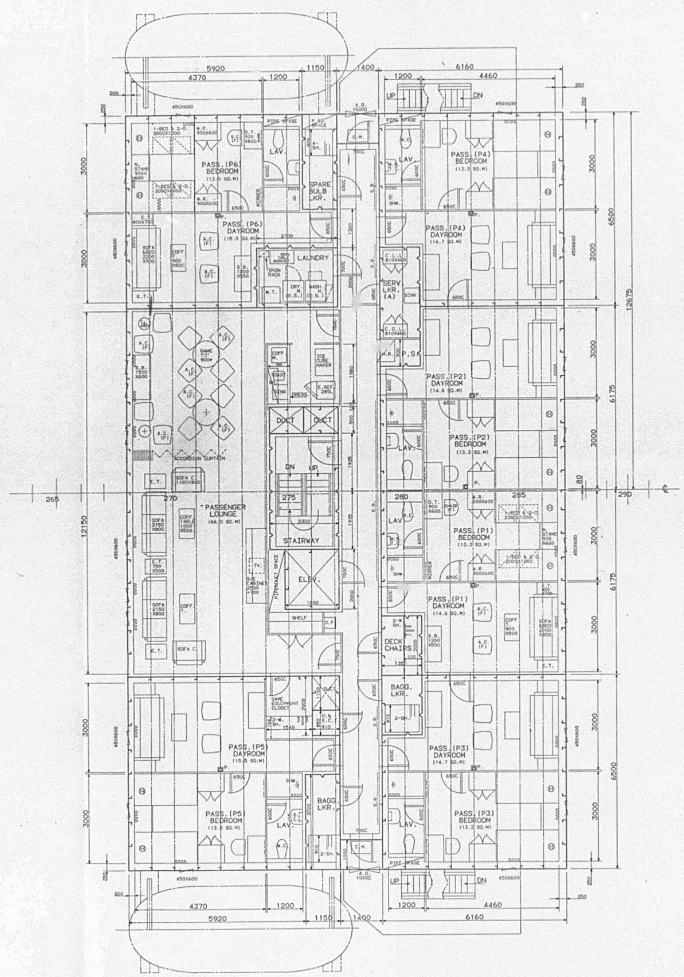
諸室配置
ACCOMMODATION PLAN
(BOAT DECK(03)) 5/8

JOB NO. / JOBCLASSIF.NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
011	1/50	330005	4111005

1241

PASSENGER DECK (04)

(DK.HT. 2700)



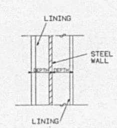
FR.SP. 770

STANDARD ABBREVIATION

A.C.	ARM CHAIR	I.D.	INSTRUMENT DISINFECTION
A.O.	ARCH OPENING	INST.LKR.	INSTRUMENT LOCKER
B.B.	BINOCULAR BOX	K.L.	KEY LOCKER
B.& D.	BED WITH DRAWER	K.T.	KITCHEN TABLE
B.C.	BOOK CASE	LKR.	LOCKER
B.R.	BOOK RACK	L.P.	LIGHT PANEL
B.S.	BOOK SHELF	MED.LKR.	MEDICINE LKR
BUT.B.	BUTCHER BLOCK	MIR.	MIRROR
C.D.	CHEST OF DRAWER	M.SLIC.	MEAT SLICER
C.L.	CLEAN TOOL LOCKER	M.T.	MESS TABLE
C.M.	COIR MAT	MIX.	MIXER
C.T.	CARD TABLE	M.W.OVEN	MICROWAVE OVEN
COFF.M.	COFFEE MAKER	N.T.	NIGHT TABLE
C.V.S.	CLEAR VIEW SCREEN	P.	PILLAR
C.L.L.	CLEAN LINEN LOCKER	P.& E.C.	PIPE & ELECTRIC CABLE
C.G.L.	CLEAN GEAR LOCKER	P.C.	PILOT CHAIR
D.F.	DRINKING FOUNTAIN	P.LKR.	PLAN LOCKER
DISP.	DISPOSER	P.P.	POWER PANEL
D.M.	DOOR MAT	RICE B.	RICE BOILER
DRESS.	DRESSER	R.A.C.	REVOLVING ARM CHAIR
D.T.	DRESSING TABLE	R.S.C.	REVOLVING SMALL CHAIR
DRY M.	DRYING MACHINE	R.C	RECLINING ARM CHAIR
E.C.	EASY CHAIR	S.B.	SIDE BOARD
E.H.	ELECTRIC HEATER	S.C.	SMALL CHAIR
E.H.P.	ELECTRIC HOT PLATE	SH.	SHELF
E.REF.	ELECTRIC REFRIGERATOR	SHW.	SHOWER
E.T.	END TABLE	S.R.	STORM RAIL
EXAM.T.	EXAMINING TABLE	S.W.	STAIRWAY
EXT.	EXTRACTOR	SERV.W.	SERVICE WINDOW
E.W.	ELECTRIC WASHING MACHINE	T.	TABLE
(F)	FASTENER FOR CHAIR & TABLE	T.C.	TOILET CABINET WITH MIRROR
F.C.	FILING CABINET	T.R.	TOILET RACK
F.T.	FOLDING TABLE	W.B.	WASH BASIN
F.W.	FIXED WINDOW	W.BOIL.	WATER BOILER
G.P.	GALLEY PANEL	W.C.	WATER CLOSET
GRAT.	GRATING	WASH.M	WASHING MACHINE
G.DISP.	GARBAGE DISPOSER	W.R.	WARDROBE
Ⓗ	HEAD END OF BED	W.T.	WASH TUB
H.R.	HOSE RECESS		
H.W.	HINGED WINDOW		
HWB	HAND WASH BASIN		
H.SLIC.	HAM SLICER		

NOTE:

LINING DEPTH



PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN	APR/1/86
		MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		USCG		ABS	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	OCT/26/84	DISCUSSION MEMO				
A	DEC/5/84	DFTS/MES/007				
B	JAN/23/85	DISCUSSION MEMO				
C	APRIL/8/85	DISCUSSION MEMO	JUN/26/85	M-00628	APRIL/10/85	T-8-2
D	JULY/22/85	DFTS/MES/764			AUG/5/85	T-8-2

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

SHIPYARD AND SHIP'S NO.	
MITSUI TAMANO NO.1323/1324/1325	MITSUBISHI KOBE NO.1158/1159/1164

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — MANAGER
OUTFITTING DESIGN SECT — SEC.CHIEF / ASST. CHIEF / CHARGE ENG'R / STAFF
DATE (TEL 2935)

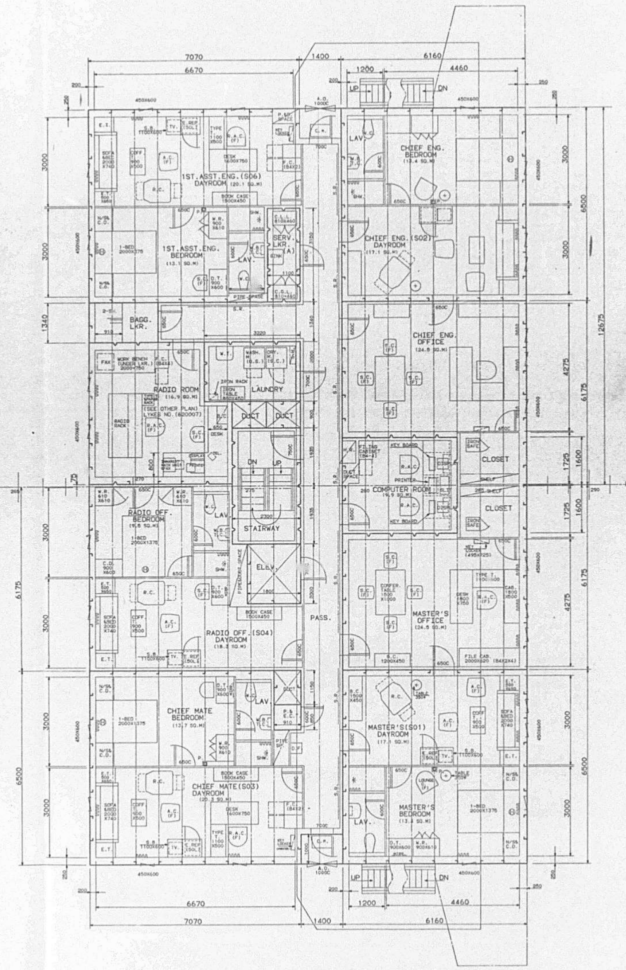
SHIP'S NO. **NO.1325** SHIP'S NAME **TILLIE LYKES**

諸室配置
ACCOMMODATION PLAN
(PASSENGER DECK(04)) 6/8

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
JOBCLASSIF.NO. D11	1/50	330006	4111006

SR.OFFICER'S DECK (05)

(DK.HT. 2770 AT ℄)



FR.SP. 770

STANDARD ABBREVIATIONS

A.C.	ARM CHAIR	I.D.	INSTRUMENT DISINFECTION
A.O.	ARCH OPENING	INST.LKR.	INSTRUMENT LOCKER
B.B.	BINOCULAR BOX		
B.& D.	BED WITH DRAWER	K.L.	KEY LOCKER
B.C.	BOOK CASE	K.T.	KITCHEN TABLE
B.R.	BOOK RACK		
B.S.	BOOK SHELF	LKR.	LOCKER
BUT.B.	BUTCHER BLOCK	L.P.	LIGHT PANEL
		MED.LKR.	MEDICINE LKR
C.D.	CHEST OF DRAWER	MIR.	MIRROR
C.L.	CLEAN TOOL LOCKER	M.SLIC.	MEAT SLICER
C.M.	COIR MAT	M.T.	MESS TABLE
C.T.	CARD TABLE	MIX.	MIXER
COFF.M.	COFFEE MAKER	M.W.OVEN	MICROWAVE OVEN
C.V.S.	CLEAR VIEW SCREEN		
C.L.L.	CLEAN LINEN LOCKER	N.T.	NIGHT TABLE
C.G.L.	CLEAN GEAR LOCKER		
		P.	PILLAR
D.F.	DRINKING FOUNTAIN	P.& E.C.	PIPE & ELECTRIC CABLE
DISP.	DISPOSER	P.C.	PILOT CHAIR
D.M.	DOOR MAT	P.LKR.	PLAN LOCKER
DRESS.	DRESSER	P.P.	POWER PANEL
D.T.	DRESSING TABLE		
DRY M.	DRYING MACHINE	RICE B.	RICE BOILER
		R.A.C.	REVOLVING ARM CHAIR
E.C.	EASY CHAIR	R.S.C.	REVOLVING SMALL CHAIR
E.H.	ELECTRIC HEATER	R.C	RECLINING ARM CHAIR
E.H.P.	ELECTRIC HOT PLATE		
E.REF.	ELECTRIC REFRIGERATOR	S.B.	SIDE BOARD
E.T.	END TABLE	S.C.	SMALL CHAIR
EXAM.T.	EXAMINING TABLE	SH.	SHELF
EXT.	EXTRACTOR	SHW.	SHOWER
E.W.	ELECTRIC WASHING MACHINE	S.R.	STORM RAIL
		S.W.	STAIRWAY
(F)	FASTENER FOR CHAIR & TABLE	SERV.W.	SERVICE WINDOW
F.C.	FILING CABINET		
F.T.	FOLDING TABLE	T.	TABLE
F.W.	FIXED WINDOW	T.C.	TOILET CABINET WITH MIRROR
G.P.	GALLEY PANEL	T.R.	TOILET RACK
GRAT.	GRATING		
G.DISP.	GARBAGE DISPOSER	W.B.	WASH BASIN
		W.BOIL.	WATER BOILER
Ⓗ	HEAD END OF BED	W.C.	WATER CLOSET
H.R.	HOSE RECESS	WASH.M	WASHING MACHINE
H.W.	HINGED WINDOW	W.R.	WARDROBE
HWB	HAND WASH BASIN	W.T.	WASH TUB
H.SLIC.	HAM SLICER		

NOTE:
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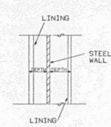


PLAN RECORD

ALT.NO.	MARK	LTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN	APR/1/86
		MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		USCG		ABS	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	OCT/26/84	DISCUSSION MEMO				
A	DEC/5/84	OFTS/MES/007				
B	JAN/23/85	DISCUSSION MEMO				
C	APRIL/8/85	DISCUSSION MEMO	JUN/26/85	M-00628	APRIL/10/85	T-8-2
D	JULY/22/85	OFTS/MES/766			AUG/5/85	T-8-2

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

SHIPYARD AND SHIP'S NO.

MITSUI TAMANO	MITSUBISHI KOBE
NO.1323/1324/1325	NO.1158/1159/1164

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT / MANAGER — SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECT / SEC.CHIEF / ASST. / CHECK / STAFF / DATE (TEL 2235)

諸室配置

ACCOMMODATION PLAN

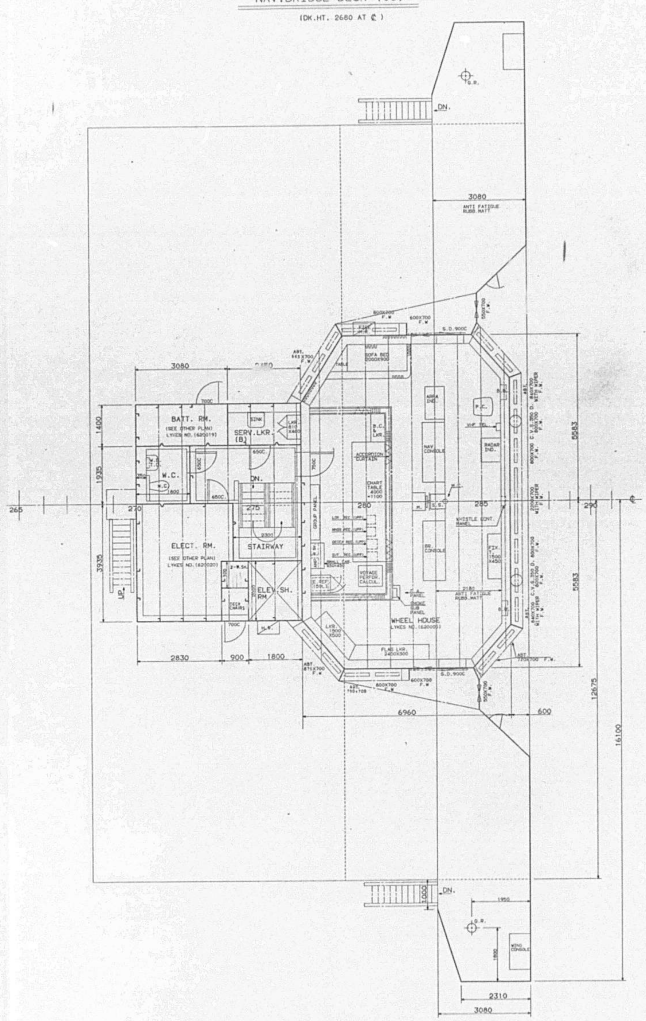
(SR.OFFR.DECK (05)) 7/8

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
JOBCLASSIF.NO. 011	1/50	330007	4111007

1243

NAV.BRIDGE DECK (06)

(DK.HT. 2660 AT ℄)

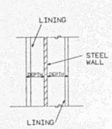


FR.SP. 770

STANDARD ABBREVIATIONS

A.C.	ARM CHAIR	I.D.	INSTRUMENT DISINFECTION
A.O.	ARCH OPENING	INST.LKR.	INSTRUMENT LOCKER
B.B.	BINOCULAR BOX	K.L.	KEY LOCKER
B.& D.	BED WITH DRAWER	K.T.	KITCHEN TABLE
B.C.	BOOK CASE	LKR.	LOCKER
B.R.	BOOK RACK	L.P.	LIGHT PANEL
B.S.	BOOK SHELF	MED.LKR.	MEDICINE LKR
BUT.B.	BUTCHER BLOCK	MIR.	MIRROR
C.D.	CHEST OF DRAWER	M.SLIC.	MEAT SLICER
C.L.	CLEAN TOOL LOCKER	M.T.	MESS TABLE
C.M.	COIR MAT	MIX.	MIXER
C.T.	CARD TABLE	M.W.OVEN	MICROWAVE OVEN
COFF.M.	COFFEE MAKER	N.T.	NIGHT TABLE
C.V.S.	CLEAR VIEW SCREEN	P.	PILLAR
C.C.L.	CLEAN LINEN LOCKER	P.& E.C.	PIPE & ELECTRIC CABLE
C.G.L.	CLEAN GEAR LOCKER	P.C.	PILOT CHAIR
D.F.	DRINKING FOUNTAIN	P.LKR.	PLAN LOCKER
DISP.	DISPOSER	P.P.	POWER PANEL
D.M.	DOOR MAT	RICE B.	RICE BOILER
DRESS.	DRESSER	R.A.C.	REVOLVING ARM CHAIR
D.T.	DRESSING TABLE	R.S.C.	REVOLVING SMALL CHAIR
E.C.	EASY CHAIR	R.C	RECLINING ARM CHAIR
E.H.	ELECTRIC HEATER	S.B.	SIDE BOARD
E.H.P.	ELECTRIC HOT PLATE	S.C.	SMALL CHAIR
E.REF.	ELECTRIC REFRIGERATOR	SH.	SHELF
E.T.	END TABLE	SHW.	SHOWER
EXAM.T.	EXAMINING TABLE	S.R.	STORM RAIL
EXT.	EXTRACTOR	S.W.	STAIRWAY
(F)	FASTENER FOR CHAIR & TABLE	SERV.W.	SERVICE WINDOW
F.C.	FILING CABINET	T.	TABLE
F.T.	FOLDING TABLE	T.C.	TOILET CABINET WITH MIRROR
F.W.	FIXED WINDOW	T.R.	TOILET RACK
G.P.	GALLEY PANEL	W.B.	WASH BASIN
GRAT.	GRATING	W.BOIL.	WATER BOILER
G.DISP.	GARBAGE DISPOSER	W.C.	WATER CLOSET
(H)	HEAD END OF BED	WASH.M	WASHING MACHINE
H.R.	HOSE RECESS	W.R.	WARDROBE
H.W.	HINGED WINDOW	W.T.	WASH TUB
HWB	HAND WASH BASIN		
H.SLIC.	HAM SLICER		

NOTE:
LINING DEPTH



PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	APR/1/86

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.
ORIGINAL	OCT/26/84	DISCUSSION MEMO				
A	DEC/5/84	OFTS/MES/007				
B	JAN/23/85	DISCUSSION MEMO				
C	APRIL/8/85	DISCUSSION MEMO	JUN/26/85	M-00628	APRIL/10/85	T-8-2
D	JULY/22/85	OFTS/MES/766			AUG/5/85	T-8-2

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

SHIPYARD AND SHIP'S NO.

MITSUI TAMANO	MITSUBISHI KOBE
NO.1323/1324/1325	NO.1158/1159/1164

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — MANAGER
OUTFITTING DESIGN SECT — SEC.CHIEF / ASST.CHIEF / CHARGE / STAFF / DATE (TEL 2235)

SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

諸室配置
ACCOMMODATION PLAN
(NAV.BRI.DECK (06)) 8/8

JOB NO. — JOB CLASSIF. NO. D11 — SCALE 1/50 — LYKES REF. NO. 330008 — MITSUI DRAWING NO. 4111008

1244

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	NOV/13 1985	OFTS/MES-1047	OCT/23 1985	M-01032				

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO. NO.1325
SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC. CHIEF
ASSISTANT CHIEF
CHARGE ENG. MAR. 5. 1987
STAFF
DATE (TEL 2236)

騒音計測結果
TEST RESULT OF NOISE LEVEL MEASUREMENT

JOB NO. TS1323/24/25
JOB CLASSIF. NO. D.09
SCALE
LYKES REF. NO. 330010
MITSUI DRAWING NO. 4109002

(29 SHEETS WITH COVER)

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5. OCT. 1986	PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. NO. 1324 AND S. NO. 1325. S. NO. 1324 WAS MEASURED WITH SOME POINT IN ACCORDANCE WITH THE RESULT OF DISCUSSION WITH OWNER, DATED JUNE 5. 1986. S. NO. 1325 WAS NOT MEASURED DUE TO OWNER ADVISE.	T. Sato T. Saka

GENERAL NOTE

DWG. NO.

REFERENCE

NO.	REF. NO	DWG NO	DWG NAME
1	090101	1100081	GENERAL ARRANGEMENT
2	330001~8	4111001~8	ACCOMMODATION PLAN

1245

Vessel Name: DOCTOR LYKES — Hull No. 1323

Type: FLUSH DECKER WITH F'CLE DECK, SEMI AFT ENGINE AND FOWARD BRIDGE — Owner: LYKES BROS STEAMSHIP CO., INC.

Built by: MITSUI ENGINEERING & SHIPBUILDING CO. LTD., TAMANO WORKS — Year Built: 1986

Dimensions

Length: 265 m — Breadth: 32.2 m — Depth: 18.8 m

Maximum draft (summer load line): 11.92 m

Machinery

Engines - Type: MITSUI-B&W DE 9L80MCE — manufacturer: MITSUI

number: 1 SET — Normal design service shaft speed: 79.7

DIESEL Generators - Type: DAIHATSU 6DL-24 — manufacturer: DAIHATSU

number: 3 SETS — Output: 1170 PS x 720 RPM. AC 480 V, 800 KW

Type of propeller: SOLID — number of propellers: ONE

Other machinery notes:

TURBO GENERATOR - TYPE : AT-34E 800KW 1800 RPM

- NUMBER : 1 SET

SHAFT GENERATOR - TYPE : MAIN ENGINE FORWARD END MOUNTED DIRECT DRIVEN 2000 KW

- NUMBER : 1 SET

Conditions During Measurement

Vessel's proximate position: KII STRAIT — Type of voyage: OFFICIAL SEA TRIAL

Draft forward: 5.4 m — Draft aft: 8.37 m — Depth of water: 270 m

Weather — Wind speed: 8~13 m/sec — Seas: CLOUD, ROUGH SEA

Vessel's direction in relation to seas: NORTH EAST

Vessel's speed: 21.9 Knots — Shaft REV.: 82.7 r.p.m.

Propeller pitch: 8388 mm AT 0.7R

Summary of machinery status:

AIR COND. PLANT : 29500 m³/h x 276 mmAq x 37 KW x 2 SETS

MECH. VENT. FAN FOR ACCOMM. : TOTAL 7 SETS RUNNING

S. NO. 1323 ~ 5

SCHEDULE OF NOISE MEASURMENT

1. GENERAL

(1) DATE : APRIL 19, 1986

(2) WITNESS — OWNER : MR. W.D. McCOSS / MR. I.C. FERGUSON } [signature]

USCG : —

(3) MEASURED BY : HULL OUTFITTING DESIGN SECT., SHIP DESIGN DEPT.

2. CONDITIONS DURING MEASURMENT

SEE PAGE 5

3. METHOD OF MEASURMENT

(1) FOLLOWING INSTRUMENT WAS USED.

Brüel & Kjær (DEMARK) MAKE PRECISION INTEGRATING SOUND LEVEL METER TYPE 2230 WHICH COMPLIES WITH THE PROPOSED IEC RECOMMENDATION FOR INTEGRATING SOUND LEVEL METERS TYPE 1 AND IEC 651 TYPE 1 (IMPULS) AND ANSI S1.4.1971 TYPE 1 STANDARDS.

(2) NOISE MEASUREMENTS WERE TAKEN IN DECIBELS USING AN A-WEIGHTING FILTER (dB(A)). THE METER WAS SET TO "SLOW RESPONSE" AND THE READINGS MADE ONLY TO THE NEAREST DECIBEL.

(3) AT EACH MEASURING POINT, THE FOLLOWING NOTICES WERE CONSIDERED.

a) WHEN MEASURING IN ACCOMMODATION SPACE, THE MICROPHONE WAS PLACED IN THE MIDDLE OF THE ROOMS AND ABOUT 1.5 METER ABOVE THE FLOOR.

b) WHEN MEASURING, DOORS AND WINDOWS WERE SHUT, AND VENTILATION AND AIR CONDITIONING PLANT WERE OPERATED.

(c) WHEN HIGHER NOISE THAN RECOMMENDED LIMITS WERE MEASURED, FOLLOWINGS WAS APPLIED.

* OCTAVE BAND ANALYSIS.

NOISE LIMITS RECOMMENDED BY IMO

1	**Work Spaces**		dB(A)
	.1	Machinery spaces (continuously manned)	90
	.2	Machinery spaces (not continuously manned)	110
	.3	Machinery control rooms	75
	.4	Workshops	85
	.5	Non-specified work spaces	90
2	**Navigation spaces**		dB(A)
	.1	Navigating bridge and chartrooms	65
	.2	Listening post, including navigating bridge wings and windows	70
	.3	Radio rooms (with radio equipment operating but not producing audio signals)	60
	.4	Radar rooms	65
3	**Accommodation spaces**		dB(A)
	.1	Cabins and hospitals	60
	.2	Mess rooms	65
	.3	Recreation rooms	65
	.4	Open recreation areas	75
	.5	Offices	65
4	**Service spaces**		-
	.1	Galleys, without food processing equipment operating	75
	.2	Serveries and pantries	75
5	**Normally unoccupied spaces**		dB(A)
		Spaces not specified	90

1246

9/

NO.	LOCATION	NOISE LIMITS BY IMO (dBA)	MEASURED NOISE LEVEL dB(A)	dB(C)	SOUND PRESSURE LEVEL (dB) OCTAVE BAND ANALYSIS 32	63	125	250	500	1K	2K	4K	8K
	NAV. BR. DK.												
801	BR. WING (P.SIDE)	70	71		84.5	77.1	78.1	73.5	67.3	60.6	58.0	52.8	46.6
801'	BR. WING (P.SIDE) (when whistle)	—	95										
802	BR. WING (S.SIDE)	70	71.5		81.1	77.6	76.0	75.3	67.4	62.3	56.1	57.2	53.7
802'	BR. WING (S.SIDE) (when whistle)	—	96.3										
803	WHEEL HOUSE (P. SIDE)	65	61.3										
804	" (S. SIDE)	"	61.1										
805	" (CENTER)	"	60.5										
806	" (BY CHART TABLE)	"	64.4										
807	RECREAT. AREA (P. SIDE)	75	82.2		83.5	79.6	76.2	75.1	67.5	61.4	57.4	54.8	52.0
808	" (S. SIDE)	"	72.6										
809	PASSAGE		52.2										
810	ELECT. ROOM	90	71.2										
	SR. OFF. DK.												
701	CH. ENG. BED RM.	60	54.3										
702	" DAY "	"	47.3										
703	" OFFICE	65	57.4										
704	COMPUTER RM.	"	57.4										
705	MASTER OFFICE	"	57.0										
706	" DAY RM.	60	51.8										
707	" BED "	"	53.4										
708	PASSAGE	—	58.2										
710	1ST. ASS. ENG. DAY RM.	60	50.9										
711	" BED RM.	"	48.2										
712	(MACHINE OFF) LAUNDRY	75	58.5										
713	RADIO RM.		57.7										
714	R. OFF. BED RM.	60	48.5										
715	" DAY "	"	47.4										

10/

NO.	LOCATION	NOISE LIMITS BY IMO (dBA)	MEASURED NOISE LEVEL dB(A)	dB(C)	SOUND PRESSURE LEVEL (dB) OCTAVE BAND ANALYSIS 32	63	125	250	500	1K	2K	4K	8K
716	CH. MATE BED RM.	60	54.4										
717	" DAY RM.	"	53.9										
	PASSENGER DK.												
601	PASS. (P4) BED RM.	60	47.6										
602	" DAY "	"	51.9										
603	PASS. (P2) " "	"	46.1										
604	" BED "	"	44.9										
605	PASS. (P1) " "	"	45.4										
606	" DAY "	"	45.2										
607	PASS. (P3) " "	"	49.1										
608	" BED "	"	53.1										
609	PASSAGE	—	51.8										
611	PASS (P6) BED RM.	60	48.9										
612	" DAY "	"	45.9										
613	(MACHINE OFF) LAUNDRY	75	55.5										
614	PASS. LOUNGE	65	53.1										
615	PASS. (P5) DAY RM.	60	48.0										
616	" BED "	"	48.2										
	BOAT DK.												
501	2ND. ASS. ENG. BED RM.	60	47.7										
502	" DAY RM.	"	43.1										
503	PILOT	"	47.3										
504	OFF. REC. RM.	65	46.1										
505	2ND MATE DAY RM.	60	51.0										
506	" BED RM.	"	49.8										
507	PASSAGE	—	53.8										

11/

NO.	LOCATION	NOISE LIMITS BY IMO (dBA)	MEASURED NOISE LEVEL dB(A)	dB(C)	SOUND PRESSURE LEVEL (dB) OCTAVE BAND ANALYSIS 32	63	125	250	500	1K	2K	4K	8K
509	CADET (B10)	60	46.6										
510	" (B8)	"	42.5										
511	3RD. ASS. ENG. DAY RM.	"	45.9										
512	" BED RM.	"	44.0										
513	3RD. MATE BED RM.	"	44.2										
514	" DAY "	"	44.0										
515	N. RELIEF ENG. (B7)	"	43.5										
516	" " (B9)	"	50.7										
	CREW DK.												
401	WIPER NO.1 (C8)	60	45.1										
402	" NO.2 (C6)	"	45.8										
403	SPARE (C4)	"	45.4										
404	" (C2)	"	45.9										
405	" (C1)	"	44.6										
406	AB. NO.3 (C3)	"	43.7										
407	" NO.2 (C5)	"	44.9										
408	" NO.1 (C7)	"	43.8										
409	PASSAGE	—	51.5										
411	(MACHINE OFF) LAUNDRY	75	51.9										
412	ELECT. BED RM.	60	43.6										
413	" DAY "	"	47.4										
414	STEWD. DAY "	"	49.0										
415	" BED "	"	48.2										
416	BOSUN BED "	"	49.7										
417	" DAY "	"	52.6										
418	OS NO.2 (C11)	"	43.5										
419	" NO.1 (C13)	"	44.4										

12/

NO.	LOCATION	NOISE LIMITS BY IMO (dBA)	MEASURED NOISE LEVEL dB(A)	dB(C)	SOUND PRESSURE LEVEL (dB) OCTAVE BAND ANALYSIS 32	63	125	250	500	1K	2K	4K	8K
	SALOON DK.												
301	HOSPITAL	60	50.5										
302	STEWARD UTIL.		45.4										
303	CREW REC. RM.	65	52.5										
304	SPARE (S1)	60	45.6										
305	CH. COOK		48.1										
306	STEWARD OFF.	65	48.8										
307	PASSAGE		56.7										
309	OFF. & PASS. DINING RM.	65	56.1										
310	DUTY MESS	"	55.9										
311	PART OF OFF. & PASS. DINING RM.	75	64.2										
312	GALLEY	"	69.5										
313	PART OF CREW MESS RM.	"	62.5										
314	CREW MESS RM.	65	54.5										
	UPPER DK.												
201	SUEZ CANAL CREW CONF. RM.	60	54.0										
202	ENG. OFFICE	65	56.3										
203	ARCHIVES RM.	—	53.5										
204	HOBBY RM.	65	54.2										
205	SLOP CHEST	—	49.7										
206	BALLAST CONT. RM & CARGO OFFICE	65	49.5										
207	SWIM. POOL	"	NOT MEASURED BECAUSE OF "OFF LIMITES"										
208	DECK CHANG. RM.	—	52.5										
209	DECK OFFICE	65	51.7										
210	(MACHINE OFF) GYMNASIUM	"	56.6										
211	HANDLING SPACE	—	60.6										
212	PASSAGE	—	60.9										

1247

13/

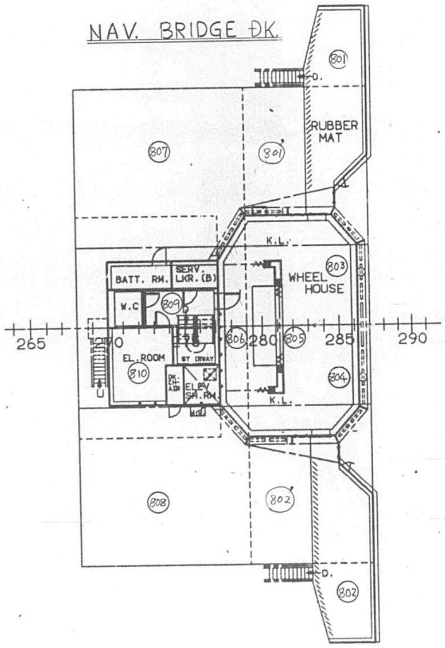
NO.	LOCATION	NOISE LIMITS BY IMO (dBA)	MEASURED NOISE LEVEL dB (A)	dB(C)	SOUND PRESSURE LEVEL (dB) OCTAVE BAND ANALYSIS 32	63	125	250	500	1K	2K	4K	8K
	2ND DECK												
101	PASSAGE	—	67.5										
102	(MACHINE OFF) SHIPS LAUNDRY	75	57.4										
103	PROV. REF. MACH. RM.	90	65.6										
	3RD DECK												
001	A/C UNIT RM.	90	87.4										
002	FWD. MACH. RM.	90	78.5										

14

NO.	LOCATION (IN ENG. ROOM)	NOISE LIMITS BY IMO (dBA)	MEASURED NOISE LEVEL dB (A)	dB(C)	SOUND PRESSURE LEVEL (dB) OCTAVE BAND ANALYSIS 32	63	125	250	500	1K	2K	4K	8K
M-1	FLOOR (S)	110	93.0										
2	FLOOR (C)	110	94.3										
3	FLOOR (P)	110	98.5										
4	SHAFT TUNNEL	110	90.0										
5	3RD DK. (S)	110	89.5										
6	3RD DK (PURI. RM)	110	88.0										
7	3RD DK (P)	110	98.3										
8	2ND DK. (S)	110	100.6										
9	2ND. DK (ENG. CONT. RM)	75	70.0										
10	2ND. DK (ENG. WORKSHOP)	85	75.8										
11	2ND DK (FORE.C)	110	99.4										
12	2ND DK NEAR THE T/C	110	103.2										
13	2ND DK (P)	110	100.1										
14	PART. DK (ELECT. STORE)	110	94.4										
15	PART. DK (ENGINE STORE)	110	94.8										
16	PART DK (ELEV. MACH. SPACE	110	79.8										
17	PART. DK (ENG. CHANGE RM)	90	80.4										
18	PART. DK (S) FR 76	110	93.2										
19	PART. DK (S) FR 82	110	83.0										
20	PART. DK (P) (ELECT. WORKSHOP)	85	76.8										
21	PART. DK (F FR 81	110	94.8										
22	UPP. DK. (C) FR 55	110	91.8										
23	UPP DK (S) (ENG. CONF. RM)	70	65.7										
24	UPP. DK (S) (LAV)	75	73.0										
25	UPP. DK (S) (PAINT RM)	90	67.6										
26	2.6 M. LEVEL (EMER. GEN RM)	110	73.0										
27	STEER. GEAR RM	110	98.0										
28	3RD DK (S. SIDE)	110	93.1										
29	3RD DK (AFT)	110	98.6										
30	3RD DK (FORE)	110	98.3										

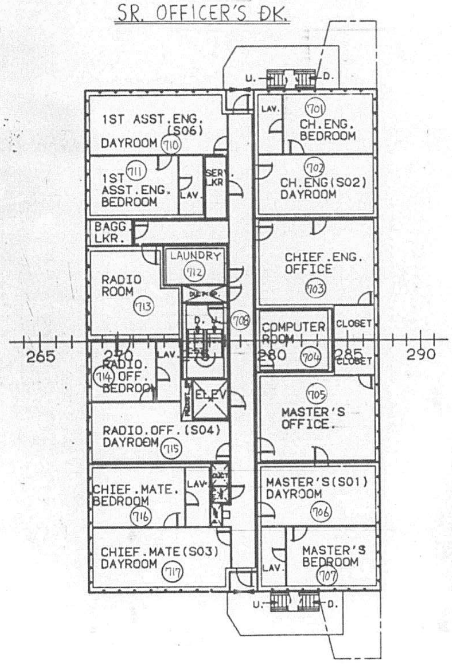
15/

NAV. BRIDGE DK.



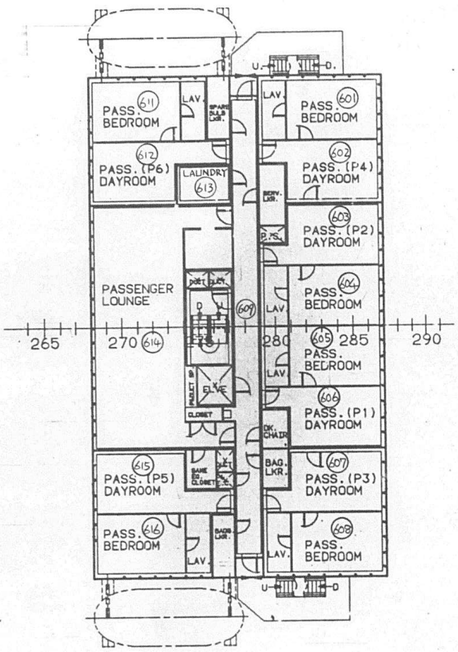
14

SR. OFFICER'S DK.

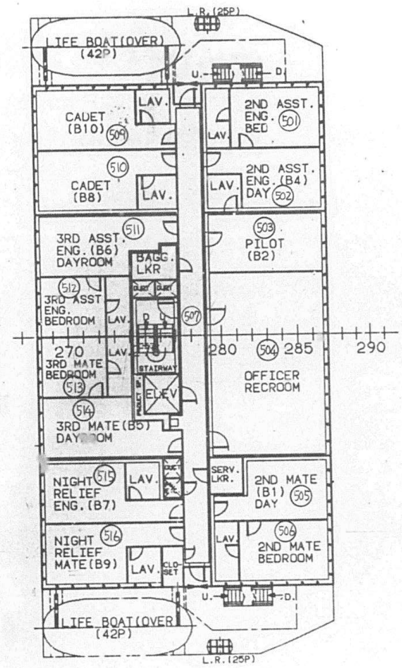


1248

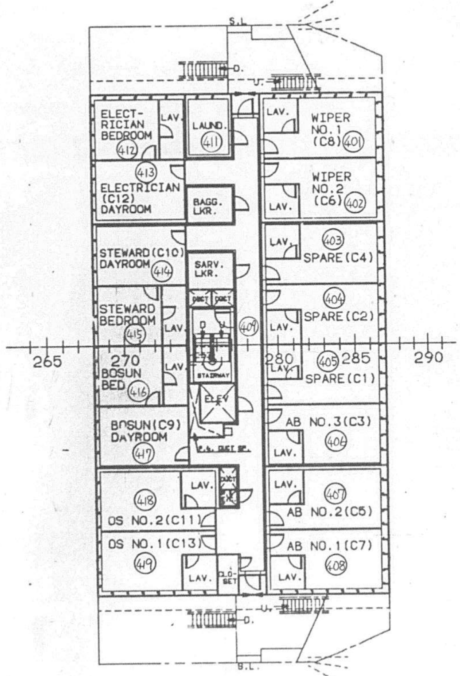
PASSENGER ÐK.



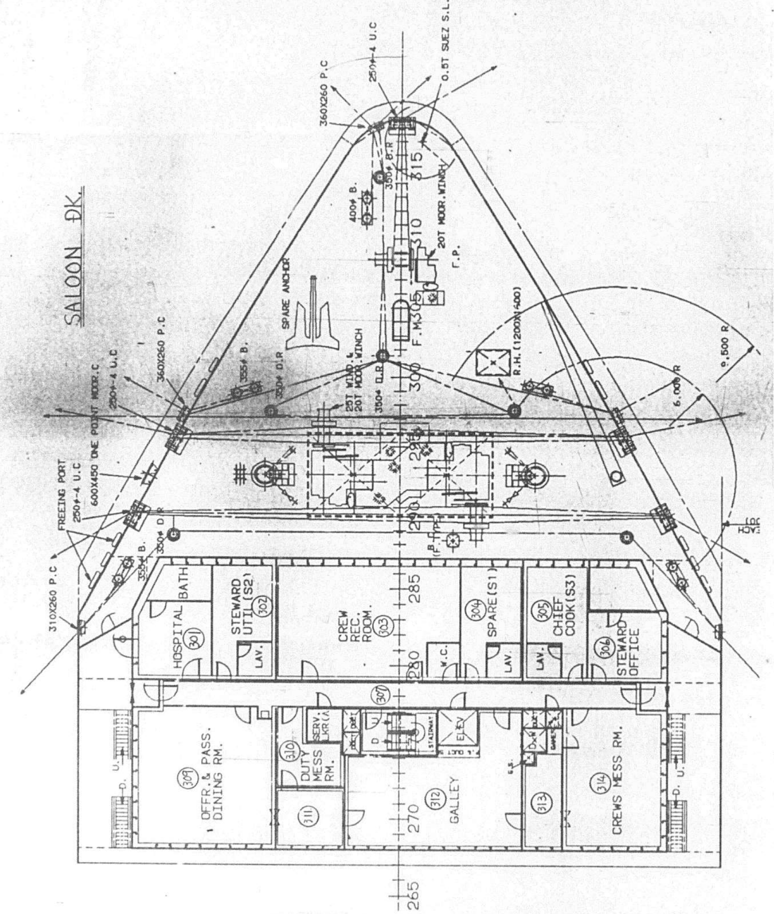
BOAT ÐK.



CREW ÐK.

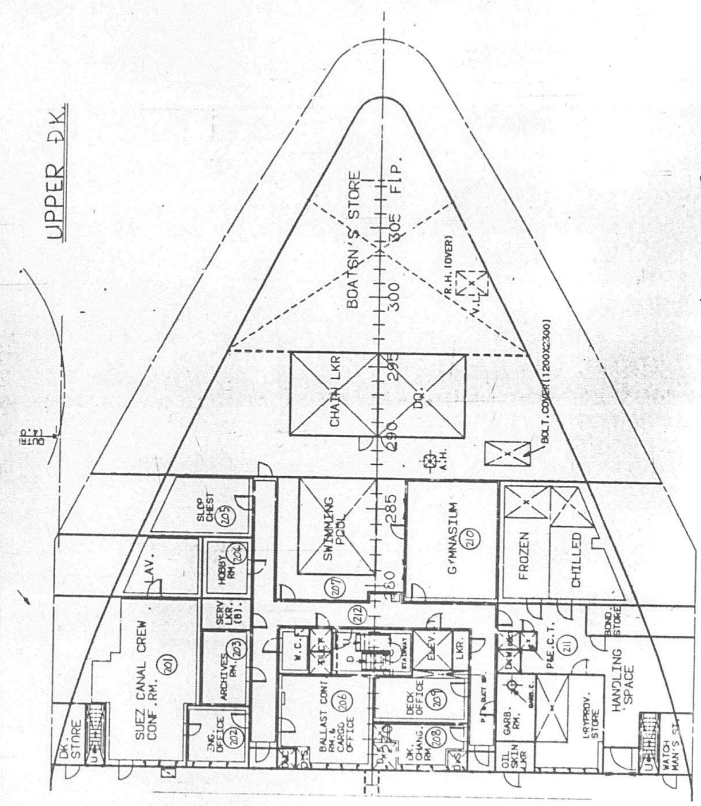


20/



SALOON DK.
SPARE ANCHOR
HOSPITAL
BATH
STEWARD UTIL.(S2)
CREW REC. ROOM
SPARE(S1)
CHIEF COOK(S3)
STEWARD OFFICE
OFFR. & PASS. DINING RM.
DUTY MESS RM.
GALLEY
CREWS MESS RM.
FREEING PORT

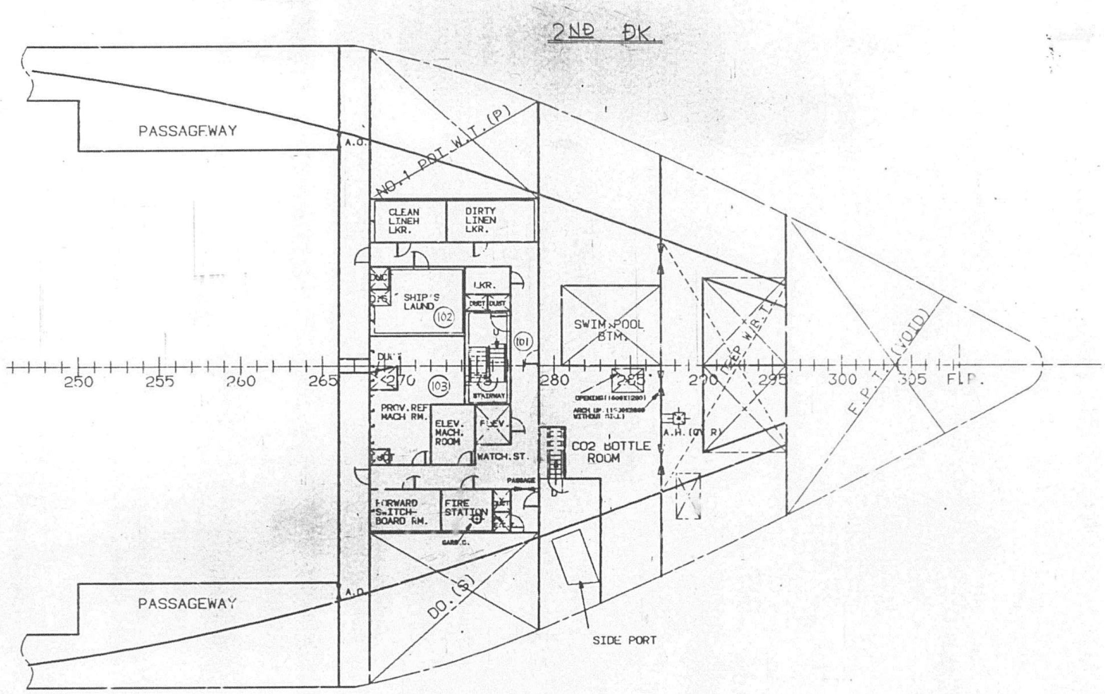
21/



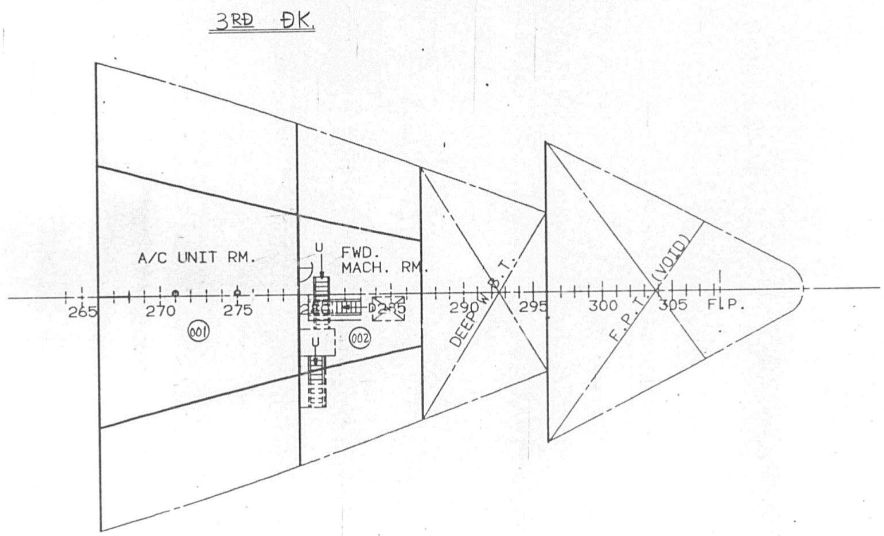
UPPER DK.
BOATSN'S STORE
CHAIN LKR
SLOP CHEST
SWIMMING POOL
GYMNASIUM
FROZEN
CHILLED
HOBBY RM.
SUEZ CANAL CREW CONF. RM.
ARCHIVES RM.
BALLAST CONT RM. & CARGO OFFICE
DECK OFFICE
HANDLING SPACE
DK. STORE

1250

22


2ND DK.
PASSAGEWAY
PASSAGEWAY
A.D.
NO. 1 POT. W.T. (P)
D.O. (S)
CLEAN LINEN LKR.
DIRTY LINEN LKR.
SHIP'S LAUND
LKR.
SWIM POOL BTM.
PROV. REF MACH RM.
ELEV. MACH. ROOM
ELEV.
WATCH. ST.
STAIRWAY
PASSAGE
CO2 BOTTLE ROOM
A.H.
FORWARD SWITCH-BOARD RM.
FIRE STATION
SIDE PORT
DEEP W.T.
F.P.T. (VOID)
F.P.
250
255
260
265
270
280
290
295
300
305

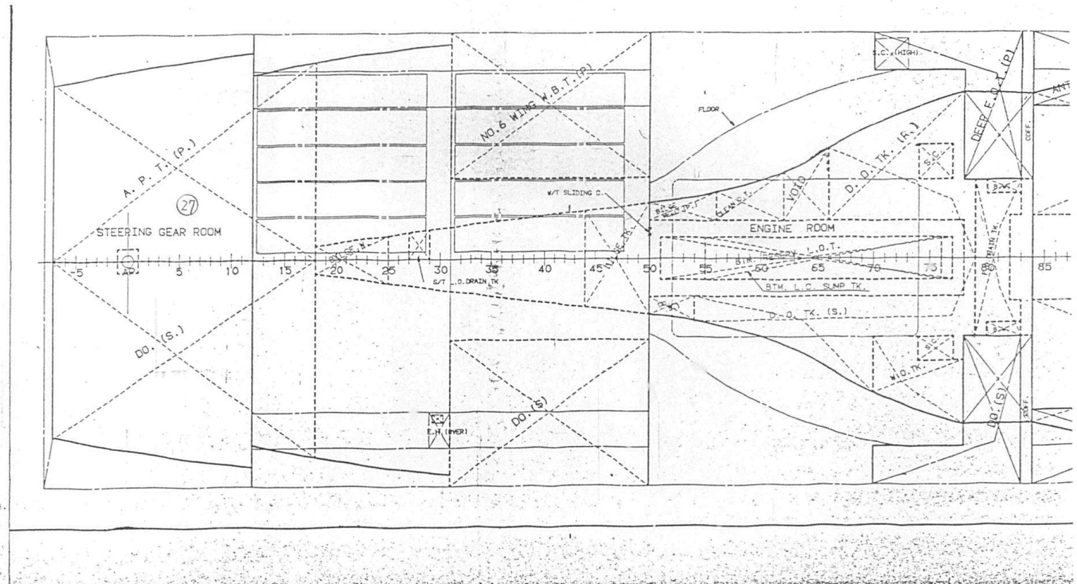
23


3RD DK.
A/C UNIT RM.
FWD. MACH. RM.
DEEP W.T.
F.P.T. (VOID)
F.P.
265
270
275
290
295
300
305
001
002

1251

24

STEERING GEAR ROOM



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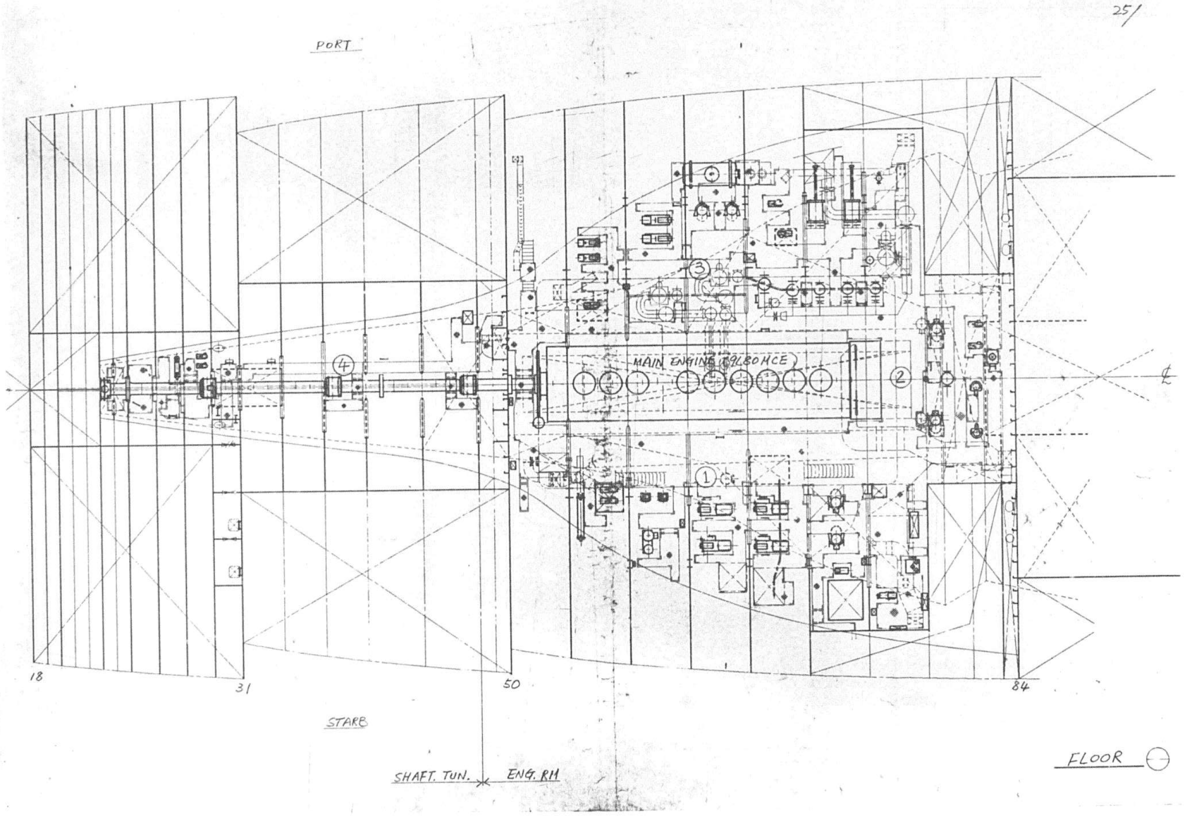
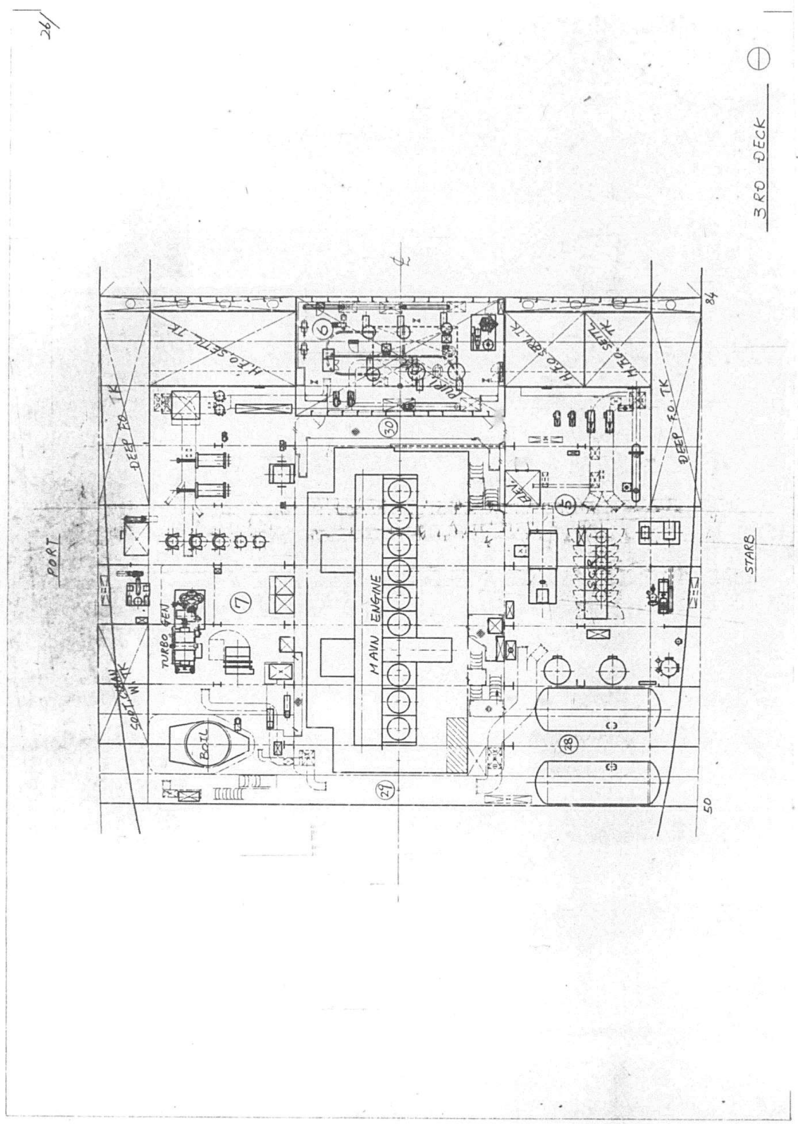
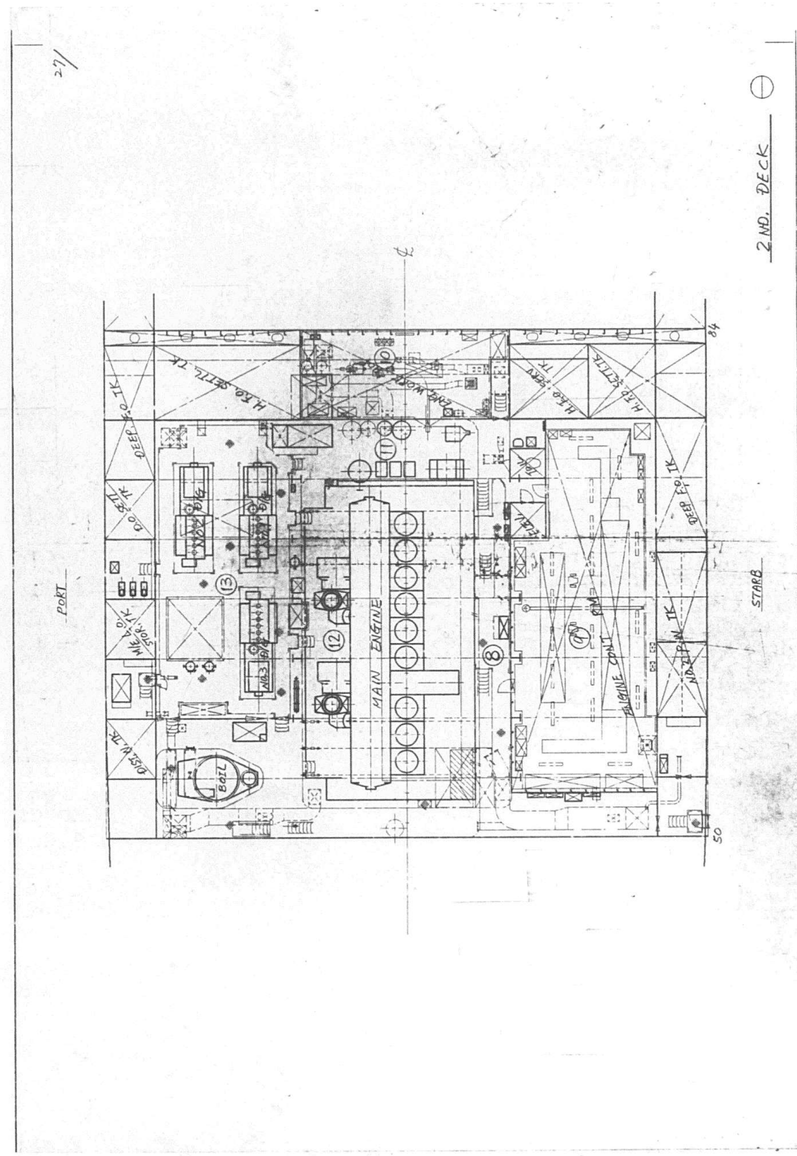
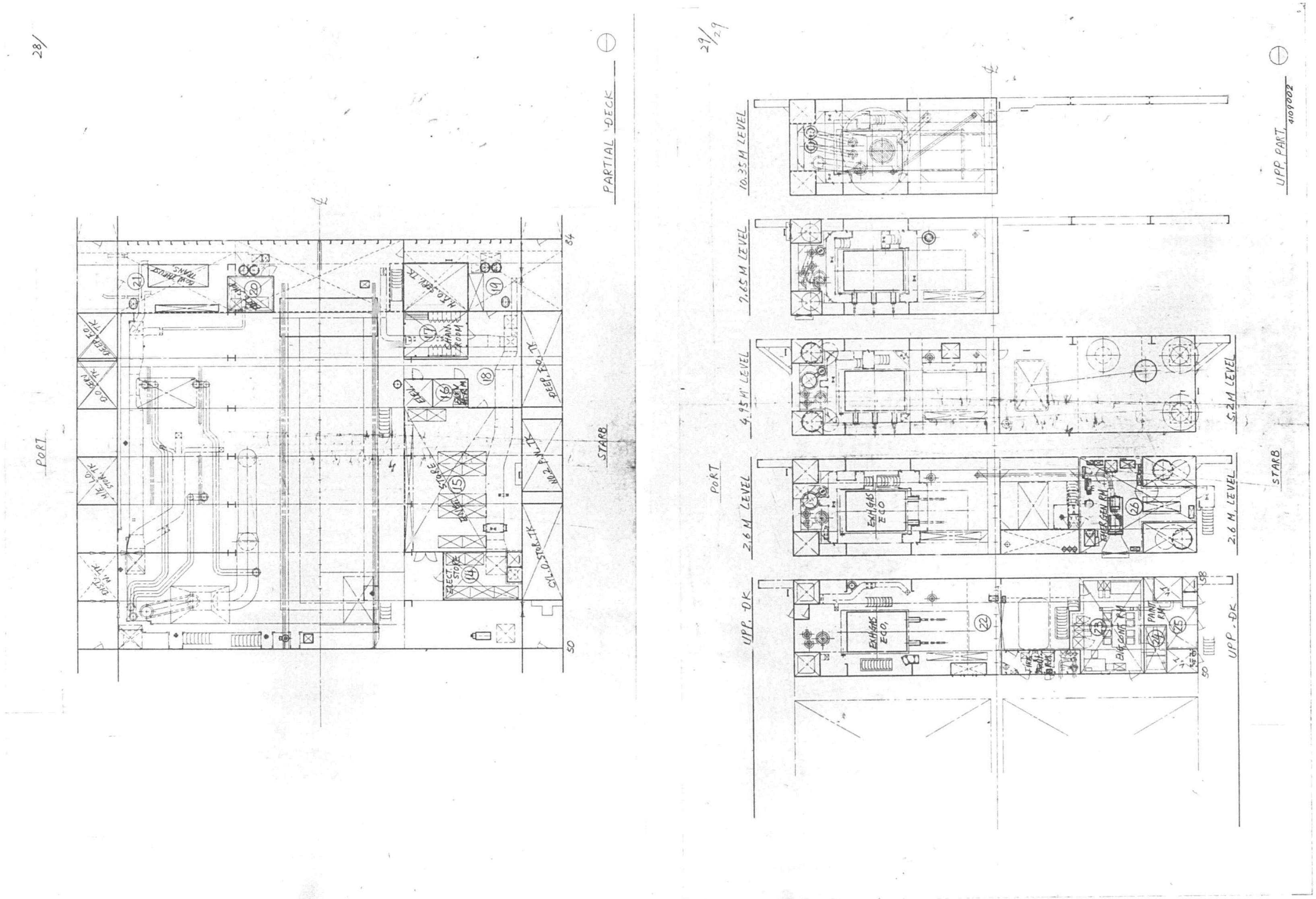



26
3RD DECK
PORT
STARB
MAIN ENGINE
DEEP F.O. TK
TURBO GEN
BOIL
84
50


27
2ND. DECK
PORT
STARB
MAIN ENGINE
DEEP F.O. TK
ENGINE CONT
BOIL
84
50



PARTIAL DECK
PORT
STARB
UPP. PART
10.35 M LEVEL
7.65 M LEVEL
4.95 M LEVEL
5.2 M LEVEL
2.6 M LEVEL
UPP. DK
EXH.GAS ECO.

1254

1

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY 1 1985	OFT/MES-371	APRIL 22 1985	M-00369			APRIL 30 1985	—
A	JULY 3 1985	OFT3/MES-654	JUNE 26 1985	H-00623			JULY 5 1985	—

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO. NO.1325 SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC.CHIEF
ASST.
CHARGE ENG'R
STAFF
DATE (TEL 2236)

MITSUI ENGINEERING & SHIPBUILDING CO. SHIP DESIGN DEPARTMENT MAR. 5. 1987

居住区内張間仕切,防熱,床張装置
ARRANGEMENT OF JOINER BULKHEAD, DECK COVERING & INSULATION

JOB NO. TS1323/24/25
JOBCLASSIF. NO. D. 09~10
SCALE
LYKES REF. NO. 330102
MITSUI DRAWING NO. 4109110

(59 SHEETS WITH COVER)

2

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5. OCT. 1986	PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. NO. 1324 AND S. NO. 1325	T. Sato T. Kato

3

GENERAL NOTE

DWG.NO. 4109110

4

REFERENCE

NO.	REF. NO	DWG NO	DWG NAME
1	330102	4109101	CONSTRUCTION OF FIRE PROTECTION
2	360601	4109103	RAT PROOFING
3			
4	330001 ~ 330008	4111001 ~ 4111008	ACCOMMODATION PLAN (1/8) ~ (8/8)
5	330301	4111020	COLOUR AND MATERIAL'S SAMPLE OF UPHOLSTERY

DWG.NO. 4109110

MAKER'S LIST FOR STRUCTUAL FIRE PROTECTION (1/2)

U.S.C.G. : UNITED STATES COAST GUARD
A.B.S. : AMERICAN BUREAU OF SHIPPING

ITEM	APPLICATION	BRAND NAME	MAKER	REMARK	
INSULATION	A-60 CLASS FIRE INSULATION	ROCK-FINE BOARD (#120) (W-18)	ASAHI ASBESTOS CO., LTD (JAPAN)	APPROVED TYPE BY U.S.C.G. CERT. NO. 164.007/54/0	SEE PAGE - 8 FOR CERTIFICATED
	THERMAL & ACOUSTIC INSULATION	ROCK-FINE BOARD (#80)	ASAHI ASBESTOS CO:LTD. (JAPAN)	APPROVED TYPE BY U.S.C.G. CERT. NO. 164.009/216/0	SEE PAGE - 9 FOR CERTIFICATE
DIVISIONAL BHD., LINING & CEILING	"B" CLASS CORRIDOR BULKHEAD	TNF PANEL (TYPE 3S)	ROCHENT A/S (DENMARK)	APPROVED TYPE BY U.S.C.G. CERT. NO. 164.008/104/0	SEE PAGE - 10 FOR CERTIFICATE
	DIVISIONAL BULKHEAD	TNF PANEL (TYPE 3S)	ROCKMENT A/S (DENMARK)	APPROVED TYPE BY U.S.C.G. CERT. NO. 164.008/104/0	SEE PAGE - 10 FOR CERTIFICATE
	LINING	TNF PANEL (TYPE 3S)	ROCKMENT A/S (DENMARK)	APPROVED TYPE BY U.S.C.G. CERT. NO. 164.008/104/0	SEE PAGE - 10 FOR CERTIFICATE

MATERIAL OF CONSTRUCTION FOR "JOINER" WORK

ITEM	MATERIAL & SURFACE	NOTE
CORRIDOR BHD.	"B" CLASS MODULAR PANEL ; 50 m/m THICK CORE OF MINERAL WOOL BOARD COVERED WITH P.V.C. LAMINATED THIN STEEL SHEET.	APPROVED TYPE BY USCG SEE NEXT PAGE FOR MAKER'S LIST
DIVISIONAL BHD.	NON-COMBUSTIBLE MODULAR PANEL; 50 % THICK CORE OF MINERAL WOOL BOARD COVERED WITH P.V.C. LAMINATED THIN STEEL SHEET	DO.
LINING	DO.	DO.
CEILING.	NON-COMBUSTIBLE MODULAR PANEL; 45 % THICK CORE OF MINERAL WOOL BOARD COVERED WITH P.V.C. LAMINATED THIN STEEL SHEET	DO.
THERMAL & ACOUSTIC INSULATION	NON-COMBUSTIBLE INSULATION ; 25~50 m/m THICK ROCK WOOL	DO.
FIRE PROTECTING INSULATION (A-60, A-15)	A-60, A-15 INSULATION ; 50~100 % THICK ROCK WOOL	DO.
DECK COVERING	NON-COMBUSTIBLE DECK COVERING ; 50 m/m HI-HEATED BOARD-"G"	DO

三井造船株式会社

ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL for Structural Insulation	EXPIRATION DATE	APPROVAL NUMBER
Asahi Asbestos Co., Ltd. 10-6, 7-Chome, Chuo-Ku Tokyo 104, Japan		28 January 1986	164.007/54/0

DESCRIPTION

"ASK Rock Fine Board-N No. 120" mineral wool type structural insulation identical to that described in Underwriters Laboratories, Inc. Report 80NK 10504, File R7710-2, dated 9 June 1980, approved for use without other insulating material to meet Class A-60 requirements in 100 mm (4 inch) thickness and nominal density of 7.5 lbs./cu. ft. (120 kg/cu. meter).

REMARKS

None

IDENTIFYING DATA

Underwriters Laboratories, Inc. Reports 78NK10504, Files R7710 and R7710-2, dated 15 February 1980 and 6 June 1980, respectively.

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item sp[illegible]ed herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is h[illegible] given. This approval shall be in effect for a period of five years from the date hereon unless sooner canceled or suspended by pro[illegible]er authority.

Given Under My Hand This 28th Day of January 19 81, at Washington, D. C.

BY DIRECTION OF THE COMMANDANT
N.W. LEMLEY, CHIEF, [illegible] BRANCH, FOR
Chief, Merchant Marine Technical Division, U. S. C. G.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 9-67)

TERMS: The approval of the item described on the face of the Certificate has been based upon the submittal of satisfactory evidence that the item specified herein complies with the applicable provisions of the navigation and [illegible]l inspection laws and the applicable regulations in Chapter I of Title 46 of the Code of Federal Regulations. The approval is subject to any conditions noted herein or in the applicable regulations governing the use thereof, for use on merchant vessels subject to Coast Guard inspection or on certain other vessels and motorboats as may be required by law or regulations.

Consideration will be given to an extension of this approval provided application is made 3 months prior to the expiration date of this Certificate.

When materials or devices covered by the approval set forth on the face hereof are to be in production, the Commander of the Coast Guard District in which the factory is located shall be notified in sufficient time to assign an inspector to the plant for the purpose of making any necessary inspections or tests.

The approval of the item covered by this certificate is valid only so long as said item is manufactured in conformance with the details of the approved drawings, specifications, or other data referred to. No modification in the approved design, construction, or materials is to be adopted until same has been presented for consideration through the Coast Guard District Commander and confirmation received that the proposed alteration is acceptable.

NOTICE: Where a manufacturer of safety-at-sea equipment is offering for sale to the maritime industry, directly or indirectly, equipment represented to be approved, which fails to conform with either the design details or material specifications, or both, as approved by the Coast Guard, immediate action may be taken to invoke the various penalties and sanctions provided by law including prosecution under 46 U.S.C., 481, which provides in part:

"Any person who willfully and knowingly manufactures or sells, or offers for sale, or has in his possession with intent to sell, any lifesaving, firefighting, or other equipment subject to the provisions of title 52 of the Revised Statutes, as amended, which is so defective as to be inefficient to accomplish the purpose for which it is intended, shall be fined not more than $10,000 and may, in addition thereto, in the discretion of the Court, be

MAKER'S LIST FOR STRUCTUAL FIRE PROTECTION (2/2)

ITEM	APPLICATION	BRAND NAME	MAKER	REMARK	
DIVISIONAL BHD., LINING & CEILING	CEILING	TNF PANEL (TYPE C54)	ROCKMENT A/S (DENMARK)	APPROVED TYPE BY U.S.C.G. CERT. NO. 164.010/9/0 164.010/8/0	SEE PAGE - 11 FOR CERTIFICATE
	INTERIOR FINISH	DESIGN 1320 (P.V.C FILM)	GISLAVED AB PLASTIC DIV (SWEDEN)	APPROVED TYPE BY U.S.C.G. CERT. NO. 012/71/0	SEE PAGE - 12 FOR CERTIFICATE
DECK COVERING	NON-COMBUSTIBLE DECK COVERING	HI-HEATBOARD-G	ASAHI ASBESTOS CO. LTD. (JAPAN)	APPROVED TYPE BY USCG CERT. NO. 164.009/247/0	SEE PAGE - 13 FOR DETAIL

ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL	EXPIRATION DATE	APPROVAL NUMBER
Asahi Asbestos Co., Ltd. 10-6, 7-Chome, Ginza, Chuo-Ku Tokyo 104 Japan	for Noncombustible Material	8 November 1989 Extension of Appr. 164.009/216/0 dated 8 November 1979.	164.009/216/0

DESCRIPTION
ASK Rock Fine Board — N, No. 80 rockwool insulation board identical to that described in Underwriters Laboratories, Inc., Report 78NK10504, File R7710, dated 30 May 1979, in nominal density of 5.6 pounds per cubic foot.

REMARKS None

IDENTIFYING DATA Underwriters Laboratories Inc., Report 78NK10504, File R7710, dated 30 May 1979.

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

Given Under My Hand This 8th Day of November 19 84, at Washington, D.C.

BY DIRECTION OF THE COMMANDANT
R. L. MARKLE, CHIEF, SURVIVAL SYSTEMS BR.
Office of Merchant Marine Safety, U.S.C.G.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 3-82) PREVIOUS EDITION IS OBSOLETE

TERMS: The approval of the item described on the face of the Certificate has been based upon the submittal of satisfactory evidence that the item complies with the applicable provisions of the navigation and vessel inspection laws and the applicable regulations in Title 33 and/or Title 46 of the Code of Federal Regulations. The approval is subject to any conditions noted on this Certificate and in the applicable laws and regulations governing the use of the item on merchant vessels subject to Coast Guard inspection or on other vessels and boats.

Consideration will be given to an extension of this approval provided application is made 3 months prior to the expiration date of this Certificate.

When materials or devices covered by the approval set forth on the face hereof are to be in production, the approval holder is responsible for making sure that the required inspections or tests are carried out as prescribed in the applicable regulations.

The approval of the item covered by this certificate is valid only so long as said item is manufactured in conformance with the details of the approved drawings, specifications, or other data referred to. No modification in the approved design, construction, or materials is to be adopted until same has been presented for consideration by the Commandant and confirmation received that the proposed alteration is acceptable.

NOTICE: Where a manufacturer of safety-at-sea equipment is offering for sale to the maritime industry, directly or indirectly, equipment represented to be approved, which fails to conform with either the design details or material specifications, or both, as approved by the Coast Guard, immediate action may be taken to invoke the various penalties and sanctions provided by law including prosecution under 46 U.S.C. 481, which provides in part:

"Any person who willfully and knowingly manufactures or sells, or offers for sale, or has in his possession with intent to sell, any lifesaving, firefighting, or other equipment subject to the provisions of title 52 of the Revised Statutes, as amended, which is so defective as to be inefficient to accomplish the purpose for which it is intended, shall be fined not more than $10,000 and may, in addition thereto, in the discretion of the Court, be imprisoned for a term not exceeding five years."

ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL	EXPIRATION DATE	APPROVAL NUMBER
Gislaved AB Plastics Div. S-33200 Gislaved Sweden	for Interior Finish	[illegible]	[illegible]

DESCRIPTION
"Design 1320" PVC film identical to that described in Underwriters Laboratories, Inc. Report 82NK19338, File R9313, dated October 14, 1982 in nominal thickness of [illegible].

REMARKS To be applied with Bostik AB's "Bostik 3700 S" adhesive in accordance with manufacturer's instructions

IDENTIFYING DATA Underwriters Laboratories Report [illegible], File R9313, dated October 14, 1982.

THIS IS TO CERTIFY THAT [illegible]

Given Under My Hand This 13th Day of November 19 [illegible]

R. L. MARKLE, [illegible] SURVIVAL SYSTEMS BR.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 3-82) PREVIOUS EDITION IS OBSOLETE

ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL	EXPIRATION DATE	APPROVAL NUMBER
Rockment A/S Hovedgaden 501 DK-2643 Hedehusene DENMARK	for Structural Ceilings	26 October 1989	164.010/9/0

DESCRIPTION
TNF Type C54 continuous ceiling as described in Underwriters Laboratories, Inc. Report 83 NK16805, File R10706-1, -2, dated 9 April 1984. Approved as meeting Class B-0 requirements with 45 mm mineral wool in steel trays. May be used in A-30 deck construction in accordance with manufacturer's approved drawings L5.039 and L5.040.

REMARKS None

IDENTIFYING DATA UL Report 83NK16805, File R10706-1, -2, dated 9 April 1984, and manufacturer's drawings L5.039 and L5.040.

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

Given Under My Hand This 26th Day of October 19 84, at Washington, D.C.

BY DIRECTION OF THE COMMANDANT
R. L. MARKLE, CHIEF, SURVIVAL SYSTEMS BR.
Office of Merchant Marine Safety, U.S.C.G.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 3-82) PREVIOUS EDITION IS OBSOLETE

ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL	EXPIRATION DATE	APPROVAL NUMBER
Rockment A/S Hovedgaden 501 DK-2640 Hedehusene DENMARK	for Structural Ceilings	26 October 1989	164.010/8/0

DESCRIPTION
TNF Type C55 continuous ceiling as described in Underwriters Laboratories, Inc. Report 83 NK16805, File R10706-1, -2, dated 9 April 1984. Approved as meeting Class B-15 requirement with 50 mm mineral wool in steel trays. May be used in A-60 deck construction with 55 mm mineral wool in accordance with manufacturer's approved drawings L5.039 and L5.040.

REMARKS None

IDENTIFYING DATA UL Report 83NK16805, File R10706-1, -2, dated 9 April 1984, and manufacturer's drawings L5.039 and L5.040.

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

Given Under My Hand This 26th Day of October 19 84, at Washington, D.C.

BY DIRECTION OF THE COMMANDANT
R. L. MARKLE, CHIEF, SURVIVAL SYSTEMS BR.
Office of Merchant Marine Safety, U.S.C.G.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 3-82) PREVIOUS EDITION IS OBSOLETE

Rockwool TNF Panel System

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ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL	EXPIRATION DATE	APPROVAL NUMBER
Asahi Asbestos Co., Ltd 10-6, 7-Chome Ginza, Chuo-Ku Tokyo 104, Japan	for Noncombustible Materials	18 August 1987	164.009/247/0

DESCRIPTION
"Asahi High Heat Board-G" noncombustible material identical to that described in Underwriters Laboratories, Inc. Report 82NK5856, File R9812, dated May 26, 1982 in nominal density of 200 kg/cu. meter.

REMARKS Factory: Ohita City, Japan.

IDENTIFYING DATA Underwriters Laboratories Report 82NK5856, File R9812, dated May 26, 1982.

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

Given Under My Hand This 18th Day of August 19 82 at Washington, D.C.

BY DIRECTION OF THE COMMANDANT
R.L. MARKLE, Acting CHIEF SURVIVAL SYSTEMS BR.
Office of Merchant Marine Safety, U.S.C.G.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 3-82) PREVIOUS EDITION IS OBSOLETE

TERMS: The approval of the item described on the face of the Certificate has been based upon the submittal of satisfactory evidence that the item complies with the applicable provisions of the navigation and vessel inspection laws and the applicable regulations in Title 33 and/or Title 46 of the Code of Federal Regulations. The approval is subject to any conditions noted on this Certificate and in the applicable laws and regulations governing the use of the item on merchant vessels subject to Coast Guard inspection or on other vessels and boats.

Consideration will be given to an extension of this approval provided application is made 3 months prior to the expiration date of this Certificate.

When materials or devices covered by the approval set forth on the face hereof are to be in production, the approval holder is responsible for making sure that the required inspections or tests are carried out as prescribed in the applicable regulations.

The approval of the item covered by this certificate is valid only so long as said item is manufactured in conformance with the details of the approved drawings, specifications, or other data referred to. No modification in the approved design, construction, or materials is to be adopted until same has been presented for consideration by the Commandant and confirmation received that the proposed alteration is acceptable.

NOTICE: Where a manufacturer of safety-at-sea equipment is offering for sale to the maritime industry, directly or indirectly, equipment represented to be approved, which fails to conform with either the design details or material specifications, or both, as approved by the Coast Guard, immediate action may be taken to invoke the various penalties and sanctions provided by law including prosecution under 46 U.S.C., 481, which provides in part:

"Any person who willfully and knowingly manufactures or sells, or offers for sale, or has in his possession with intent to sell, any lifesaving, firefighting, or other equipment subject to the provisions of title 52 of the Revised Statutes, as amended, which is so defective as to be insufficient to accomplish the purpose for which it is intended, shall be fined not more than $10,000 and may, in addition thereto, in the discretion of the Court, be imprisoned for a term not exceeding five years."

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LIST OF CEILING, PARTITION WALL & LINING PANEL

LOCATION	MARK	THICK (MM)	MATERIAL	NOTE
CEILING	M	45	MODULAR PANEL WITH P.V.C. FILM	APPROVED TYPE BY U.S.C.G
	S	1.0	STAINLESS STEEL SHEET (SUS-304)	
	AL	1.5	ALUMINUM SHEET	
	G	0.8	COLORED GALVANIZED STEEL SHEET	WHITE
PARTITION WALL			STEEL WALL	※1) TYPE A) PENETRATION TO BE APPLIED FOR PIPE, DUCT & CABLE
			DO.	※2) TYPE B) PENETRATION TO BE APPLIED FOR PIPE, DUCT & CABLE
		50	"B" CLASS MODULAR PANEL WITH P.V.C. FILM	AS ABOVE APPROVED TYPE BY U.S.C.G
		50	MODULAR PANEL WITH P.V.C. FILM	APPROVED TYPE BY U.S.C.G.
LINING		50	MODULAR PANEL WITH P.V.C. FILM	APPROVED TYPE BY U.S.C.G.
		25	DO	DO.
		1.0	STAINLESS STEEL SHEET (SUS-304)	
		1.5	ALUMINUM SHEET	
		0.8	COLORED GALVANIZED STEEL SHEET	WHITE
		MIN. 1.6	STEEL PLATE (DRAUGHT STOP)	※2) TYPE B) PENETRATION TO BE APPLIED FOR PIPE, DUCT & CABLE

※1 TYPE A) MEANS COMPLETE FIRE PROOF PENETRATION USING STEEL PENETRATING PIECE.

※2 TYPE B) MEANS FIRE RETARDING PENETRATION AS EFECTIVE AS CLASS B USING COVER PLATE.

NOTICE: NO MARK CEILINGS AND WALLS IN THE ARRANGEMENT SHALL BE FINISHED WITH PAINT.

三井造船株式会社

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LIST OF THERMAL & ACOUSTIC INSULATION

MARK	COVERING ON INSULATION	THICKNESS OF INSLATION: DECK	BEAM	WALL	STIFFENER
	—	50 M/M ROCK WOOL	25 M/M ROCK WOOL	—	—
	—	DO.	—	—	—
	0.8 M/M COLORED GALV. STEEL SHEET	DO.	—	—	—
A-60	—	A-60 INSULATION (APPROVED TYPE) BY U.S.C.G SEE PAGE 47-48 FOR DETAIL		—	—
A-60	0.8 M/M COLORED GALV. STEEL SHEET	DO.	DO.	—	—
t	—	—	—	50 M/M ROCK WOOL	25 M/M ROCK WOOL
t	—	—	—	DO.	—
t	0.8 M/M COLORED GALV. STEEL SHEET	—	—	DO	—
t, A-60	—	—	—	A-60 INSULATION APPROVED TYPE BY U.S.C.G. SEE PAGE 47-48 FOR DETAIL	—
A-60	0.8 M/M COLORED GALV. STEEL SHEET	—	—	DO.	DO.
	—	—	—	50 M/M ROCK WOOL	—
t	—	—	—	25 M/M ROCK WOOL	—

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LIST OF DECK COVERING

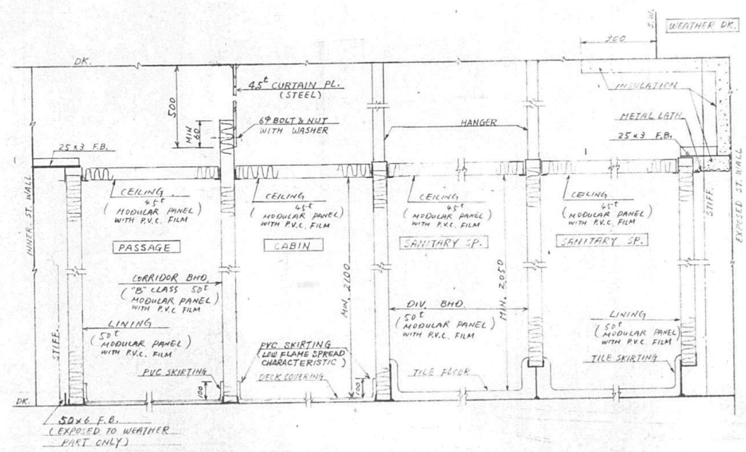
MARK	DETAIL: UNDERLAYMENT	FINISHING	THICK. (M/M)	NOTE
1	8 M/M LATEX DK. COMP.	DRESSING EMULSION	8	
2	6 M/M 〃 〃	2 M/M VINYL TILE	8	
3	6 M/M 〃 〃	7 M/M CARPET	13	ALL WOOL
4	2 M/M 〃 〃	6 M/M TARAFLEX SPORT	8	
5	6 M/M LATEX DK. COMP. ON PERLITE CEMENT	2 M/M VINYL TILE	74	SEE PAGE 43 FOR DETAIL
6	6 M/M LATEX DK. COMP. ON 50 M/M HI-HEAT BOARD "G" ※1	2 M/M 〃 〃	74	SEE PAGE 43 FOR DETAIL
7	〃 ※1	DRESSING EMULSION	72	SEE PAGE 43 FOR DETAIL
8	25 M/M CEMENT	NONSKID. MOSAIC TILE (9t × 25 × 25)	29	
9	30 M/M 〃	NONSKID. GROOVED TILE (10t × 100 × 100)	40	
10	15 M/M RUBBER MAT (K.R.C. MAT)	—	15	NAV. BR. WING
11	RINK RUBBER MAT (SMALL HOLE)	—	9.5	SWIMMING POOL
12	6 M/M LATEX DK. COMP. ON PERLITE CEMENT	DRESSING EMULSION	—	HANDLING SPACE
13	6 M/M LATEX DK. COMP. ON PERLITE CEMENT	7 M/M CARPET	—	GYMNASIUM

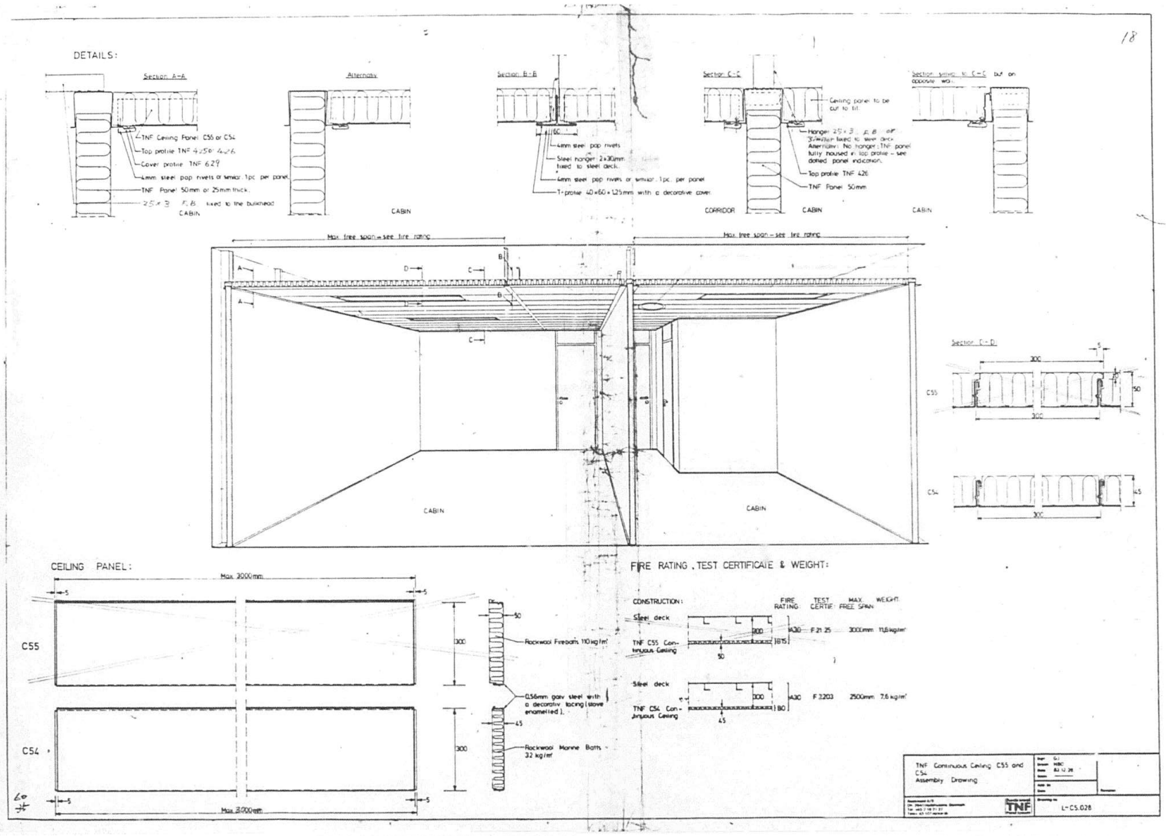
※1: HI-HEAT BOARD "G" (NONCOMBUSTIBLE) : APPROVED TYPE BY U.S.C.G. (APPROVAL NO. 164.009/247/0)

NOTICE:

1. DECK COVERING SHALL BE SLOPED DOWN (abt. 15/1000) TOWARD DECK SCUPPERS TO FACILITATE PROPER DRAINAGE.
2. THE DECK COMPOSITION SHALL BE LAID UNDER THE BUILT-IN FURNITURE IN ACCOMMODATION SPACE, BUT FINISHING OR FLOORING SHALL NOT BE APPLIED UNDER BUILT-IN FURNITURE.
3. NO MARK FLOORS IN THE ARRANGEMENT SHALL BE FINISHED WITH PAINT.

(4) TYPICAL CONSTRUCTION OF BULKHEAD & LINING





Introduction

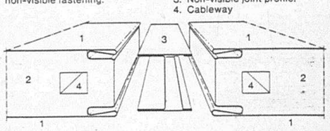
TNF System 3S consists of an assortment of panels and a set of assembly profiles, all supplied ready for installation.

The panels have a rockwool core faced with PVC foil coated steel and a joint with a H-shaped non-visible profile.

All the panels have a standard width of 600 mm and a height (length) suiting the distance required from deck to ceiling.

For non-modular installation, the panels may have to be cut to fit at corners, T-joints etc. and are assembled by means of visible profiles, which are designed for non-visible fastening.

1. Surface of decorated PVC coated steel with protection film on two sides, or one side with galv. steel backing.
2. Rockwool core.
3. Non-visible joint profile.
4. Cableway



Panel Assortment

The TNF System 3S non modular version consists of the following panel types:

- Standard panel .... A6 — For partitioning and lining throughout the accommodation.
- Facing panel .... F6 — For lining and facing of bathroom units.

- Conduit panel, single P6
- Conduit panel, twin Q6

Standard type panel with one or two ducts for multicable wiring.

Product Specifications

		Panel-type -code	Standard A 6[1])	Facing F 6			Conduit, twin Q 6
Dimensions: • Height (length)	Standard- up to		2.500 mm (8 ft.)	2.500 mm (8 ft.)			2.500 mm (8 ft.)
	max height		5.000 mm (16 ft.)	4.000 mm (13 ft.)			5.000 mm (16 ft.)
• Width			600 mm (2 ft.)	600 mm (2 ft.)			600 mm (2 ft.)
• Thickness			50 mm (2 inch)	25 mm (1 inch)			50 mm (2 inch)
Facing	• Decorative surface • Backing *) PVC-coating		– PVC*) coated steel sheets – Brushed stainless steel (for galley) – Galvanized steel sheets – PVC-foil, classified as low flame spread material according to SOLAS 1974, covered with protection film				
Weight	exclusive profiles		19.5 kg/sqm (4 lb/sq. ft.)	15.5 kg/sqm (3.2 lb/sq. ft.)			19.5 kg/sqm (4 lb/sq. ft.)
	inclusive profiles		22.0 kg/sqm (4.5 lb/sq. ft.)	17.5 kg/sqm (3.6 lb/sq. ft.)			22.0 kg/sqm (4.5 lb/sq. ft.)
Fire class	• SOLAS 1974 [2])		B15	B0			B15
	• Approvals		TNF System 3S has universal approval, inclusive USCG, ABS, DOT, LR, DNV, SBG, RINA Certificates with approved drawings available on request				
Noise reduction, la-value (Lab.)			34 dB	33 dB			34 dB
Thermal insulation			λ = 0,044 W/m °C (approx. = 0.0077 Btu.in/ft.²h.°F)				

All measurements in ft. and inches are approximate.

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Telex: 43 107 rockm dk

Rockwool TNF Panel System — Subject: TNF Panel System 3S Non Modular Installation

Electric Installation

The electric cables are installed at the same time as the TNF Panels – or later.
The cable is placed in the cableway and taken out through the hole for the switch box, cut out in the panel.

Note: It is possible to have cables on both sides of the joint.

The wiring procedure is as follows

a) Cut the hole for the switch box right in front of the cableway.
b) Push a feeler into the switch-box hole, through the pre-cut cableway and upwards until it protrudes through the top of the panel. By attaching the electric cable to the feeler it will position the cable as the feeler is withdrawn.

For multiple wiring a special panel with one or two ducts is available. Installation procedure follows the same guideline as for wiring at the joints.

It is advisable to try the procedure first before installing all the panels.

Concealed Wiring
With concealed wiring as shown in fig. A and B, the question has arisen as to whether there is a risk of increased temperature around the cables because of the surrounding thermal insulation material. This has been investigated by means of tests carried out by Det Norske Veritas. These tests show that there are no risks of high temperatures destroying or in any way affecting the cables.

General on wiring
Not all countries allow concealed wiring, but require surface mounted installation of the cables.
Some owners may also prefer this arrangement.
Special profiles for surface mounted cables are available

Detailed information on methods of electric installation can be found in the brochure: »Rockwool TNF Panels – Wiring« which is available on request.

Concealed Wiring

Fig. A
Standard cableway

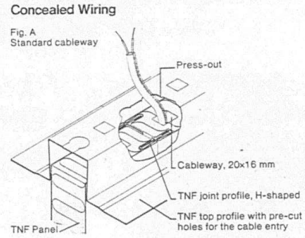
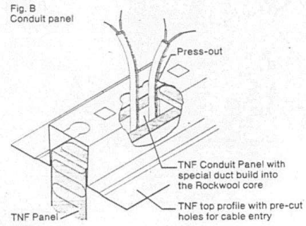
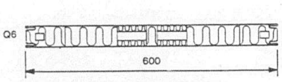


Fig. B
Conduit panel



Panels with one or two ducts for easy wiring of electric cables.
Duct: 70×21 mm

Conduit Q6 twin



To maintain the B 15 fire rating and the noise insulation, two opposite switch boxes (on each side of panel) must not be connected to the same duct or cableway.

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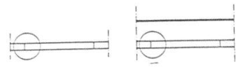
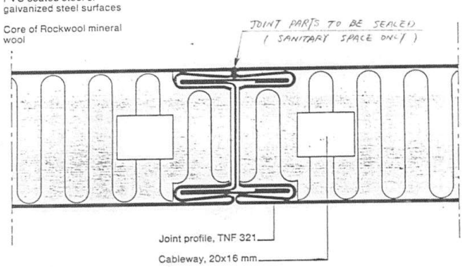
Rockwool TNF Panel System — Subject: TNF Panel System 3S Non Modular Installation

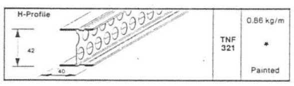
Standard Joints



50 mm TNF Panel

1. PVC coated steel or galvanized steel surfaces
2. Core of Rockwool mineral wool





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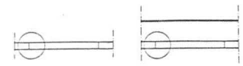
Rockwool TNF Panel System

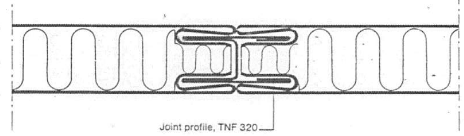
Subject: TNF Panel System 3S
Non-modular Installation

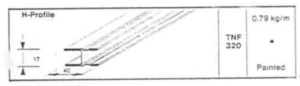
Standard Joints



25 mm TNF Panel

1. PVC coated steel or galvanized steel surfaces
2. Core of Rockwool mineral wool





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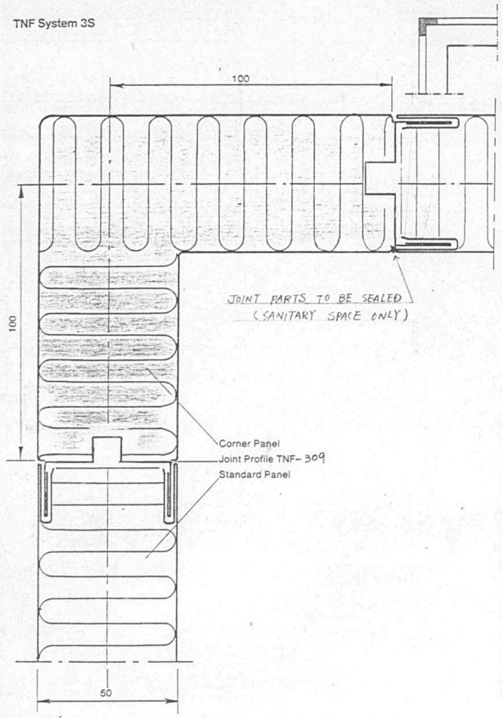
Rockwool TNF Panel System

Subject: TNF Panel System 3S
Non-modular Installation

TNF System 3S



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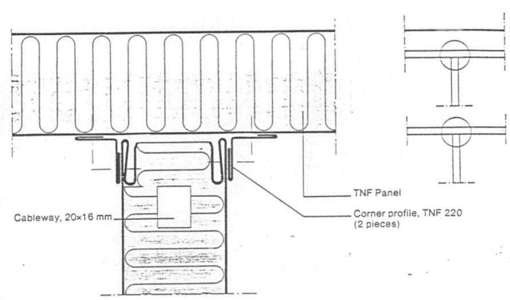
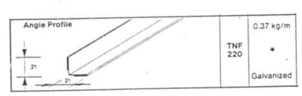
Rockwool TNF Panel System

Subject: Corner construction
with Corner Panel (Panel type D)

T-joints





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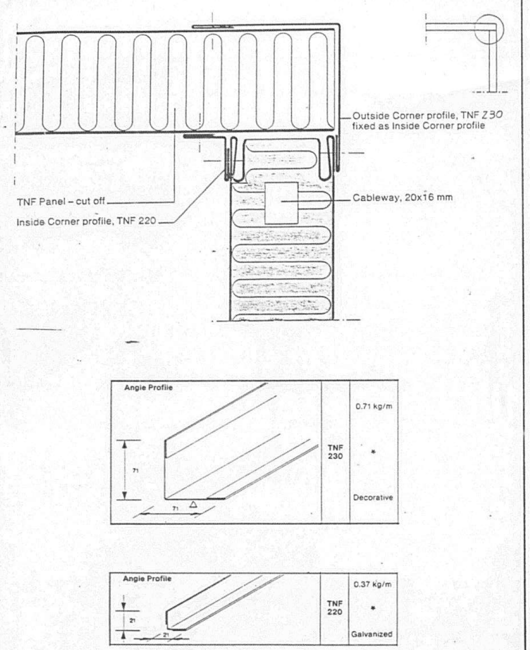
Rockwool TNF Panel System

Subject: TNF Panel System 3S
Non Modular Installation

Corner Joints

25



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Rockwool TNF Panel System

Subject:
TNF Panel System 3S
Non Modular Installation

T-joints

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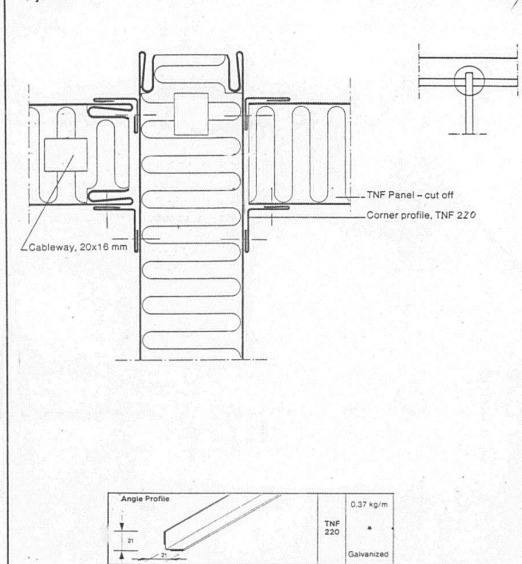

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Rockwool TNF Panel System

Subject:
TNF Panel System 3S
Non Modular Installation

Lining

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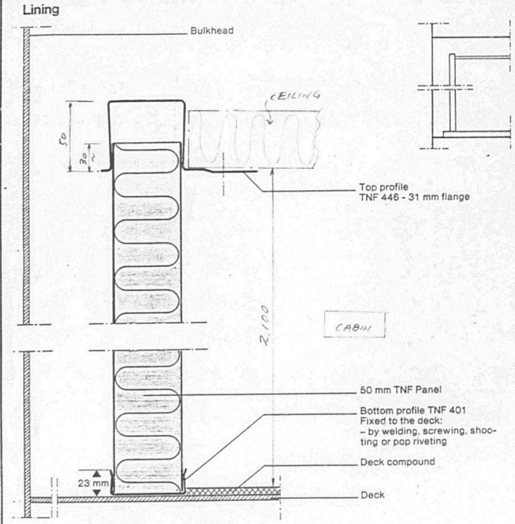

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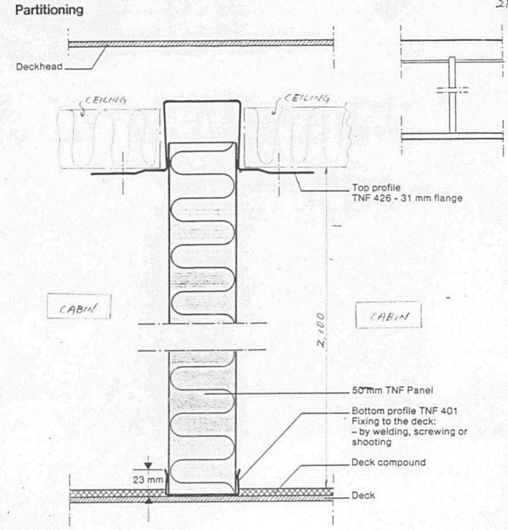
Rockwool TNF Panel System

Subject:
TNF Panel System 3S
Non Modular Installation

Partitioning

28

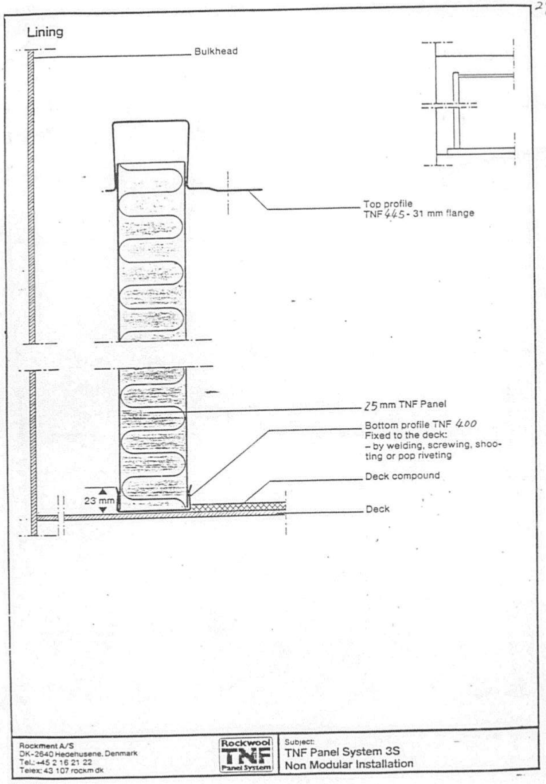


Rockment A/S
DK-2640 Hedehusene, Denmark
Tel.: +45 2 16 21 22
Telex: 43 107 rockm dk

Rockwool TNF Panel System

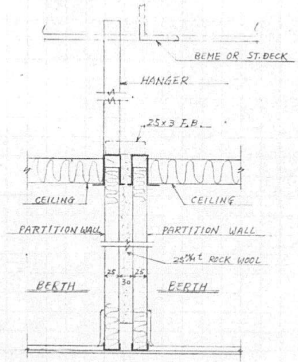
Subject:
TNF Panel System 3S
Non Modular Installation

29



30

ACOUSTIC INSULATION OF DIVISIONAL WALL



LOCATI N

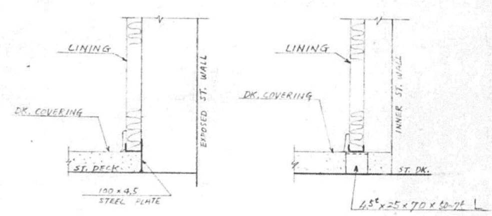
- ETWEEN PASS. (P1) BED RM. AND PASS. (P2) BED RM.
- BETWEEN 3RD. MATE BED RM. AND 3RD. ASST. ENG. BED RM.
- BETWEEN SPARE (C1) AND SPARE (C2)
- BETWEEN BOSUN BED RM. AND STEWD. BED RM.

三 井 造 船 株 式 会 社

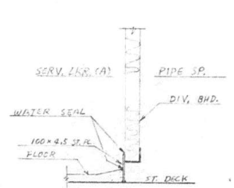
31

BOTTOM OF LINING & DIVISIONAL WALL

SUEZ CANAL CREW CONF. RM., ENG. OFFICE
ARCHIVES RM., GYMNASIUM



SERV. LKR. (A) ON PASSENGER DK.

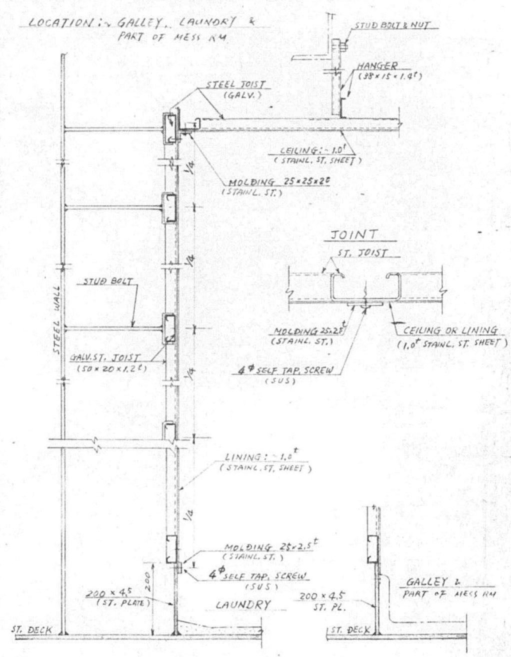


32

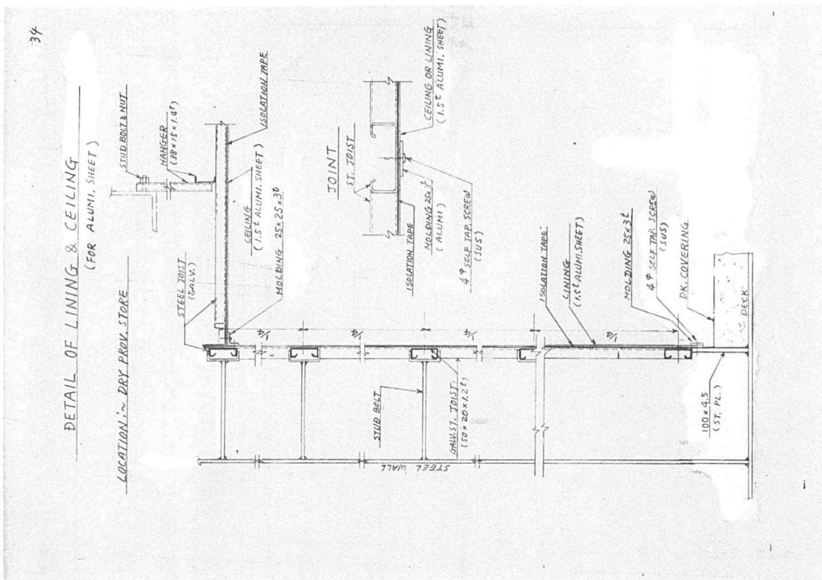
DETAIL OF LINING & CEILING

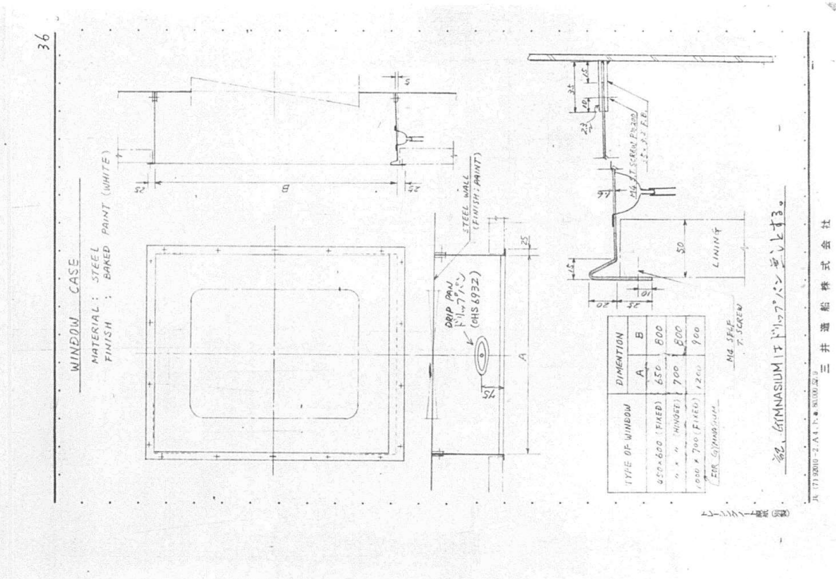
(FOR STAINLESS ST. SHEET)

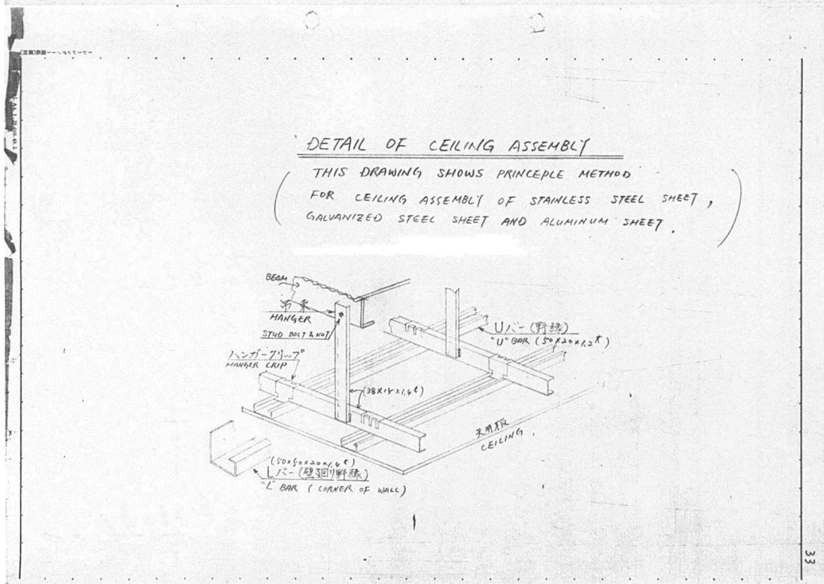
LOCATION: GALLEY, LAUNDRY & PART OF MESS RM

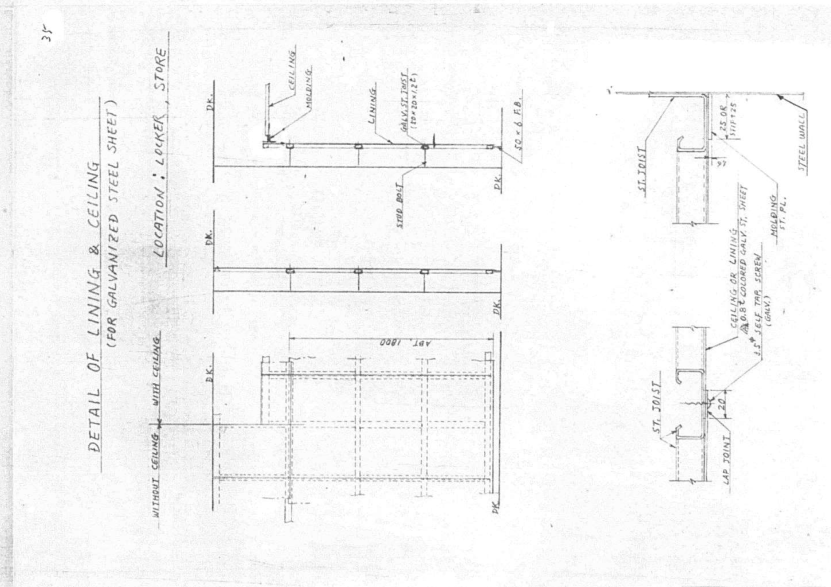


1263


34
DETAIL OF LINING & CEILING
(FOR ALUMI. SHEET)
LOCATION : DRY PROV. STORE
JOINT
STEEL WALL


36
WINDOW CASE
MATERIAL : STEEL
FINISH : BAKED PAINT (WHITE)
LINING

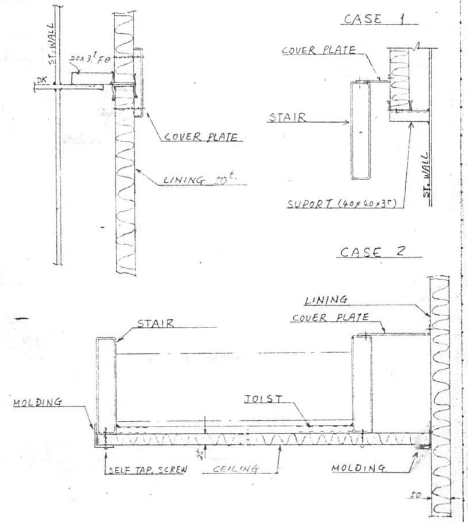

DETAIL OF CEILING ASSEMBLY
THIS DRAWING SHOWS PRINCEPLE METHOD
FOR CEILING ASSEMBLY OF STAINLESS STEEL SHEET,
GALVANIZED STEEL SHEET AND ALUMINUM SHEET.
BEAM
HANGER
STUD BOLT & NUT
ハンガークリップ
HANGER CRIP
Uバー（野縁）
"U" BAR
Lバー（壁廻り野縁）
"L" BAR (CORNER OF WALL)
天井板
CEILING
33


35
DETAIL OF LINING & CEILING
(FOR GALVANIZED STEEL SHEET)
LOCATION : LOCKER , STORE
ST. JOIST
LAP JOINT
STEEL WALL

1264

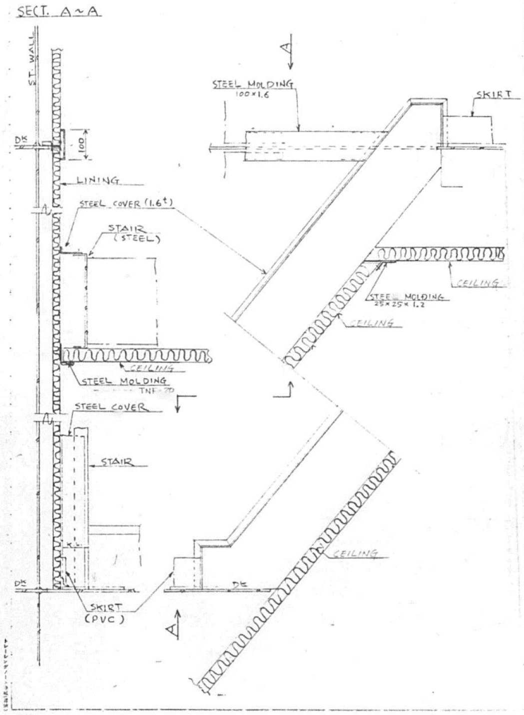
37

TYPICAL CONSTRUCTION FOR LINING IN WAY OF STAIR WAY



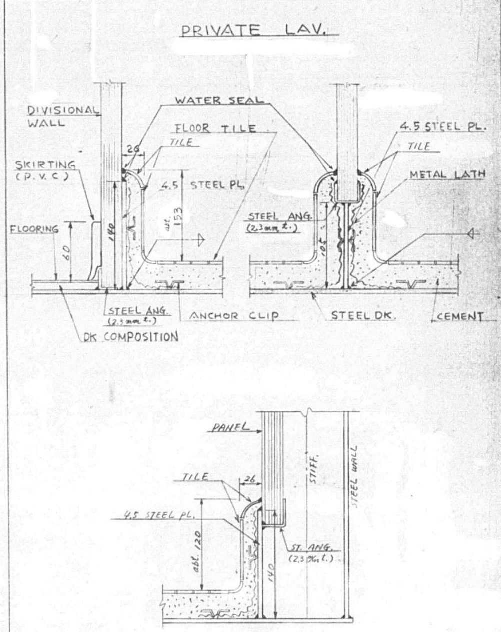
38

TYPICAL CONSTRUCTION FOR LINING & CEILING IN WAY OF STAIR WAY



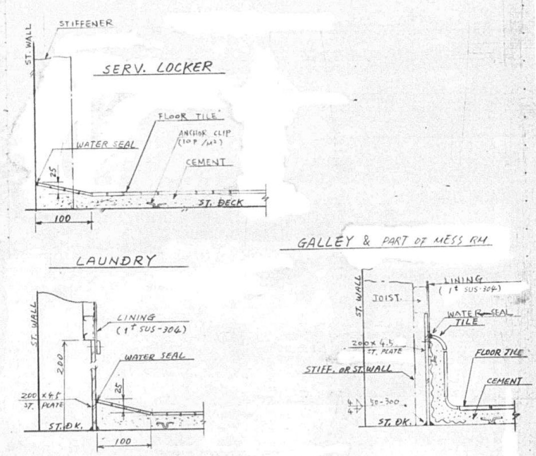
39

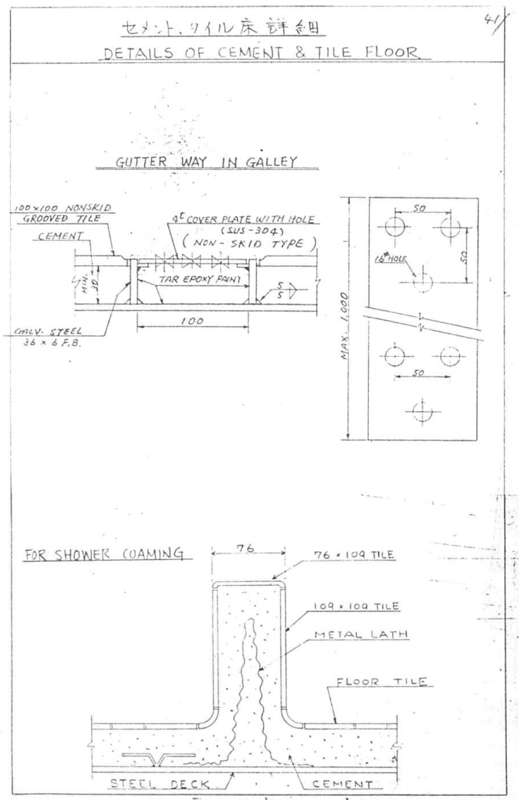
タイル腰張要領
DETAIL OF TILE SKIRTING

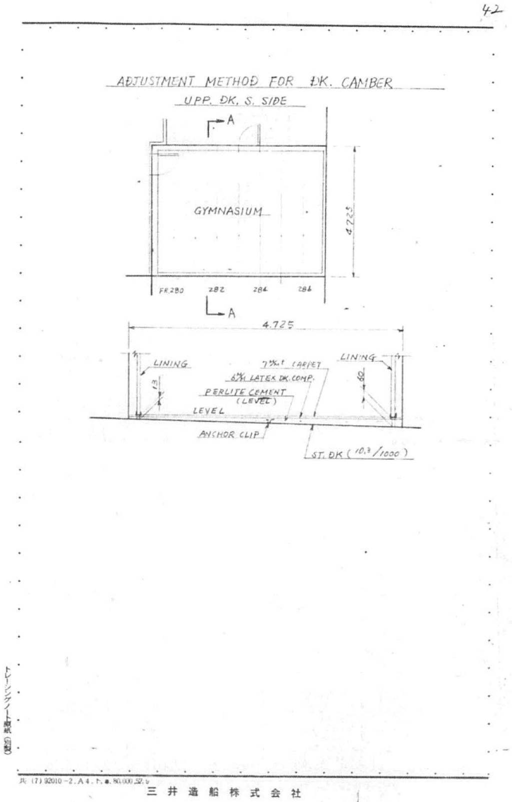


40

DETAILS OF TILE SKIRTING




41
セメント.タイル床詳細
DETAILS OF CEMENT & TILE FLOOR
GUTTER WAY IN GALLEY
100×100 NONSKID GROOVED TILE
CEMENT
4t COVER PLATE WITH HOLE (SUS-304) (NON-SKID TYPE)
TAR EPOXY PAINT
GALV. STEEL 36 × 6 F.B.
100
50
12φ HOLE
MAX. 1,000
FOR SHOWER COAMING
76
76 × 109 TILE
109 × 109 TILE
METAL LATH
FLOOR TILE
STEEL DECK
CEMENT


42
ADJUSTMENT METHOD FOR DK. CAMBER
UPP. DK. S. SIDE
GYMNASIUM
4.225
4.725
LINING
7m/m t CARPET
6m/m LATEX DK. COMP.
PERLITE CEMENT (LEVEL)
LEVEL
ANCHOR CLIP
ST. DK (10.3/1000)
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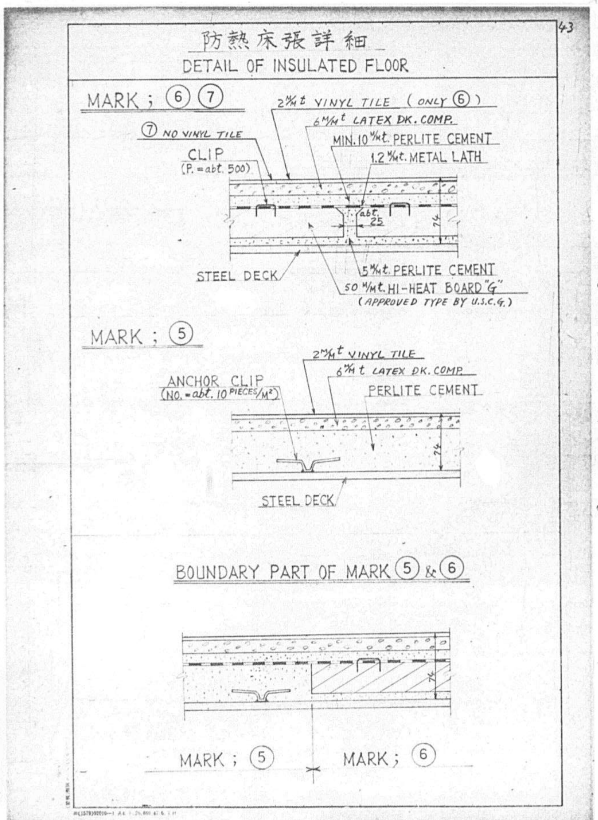
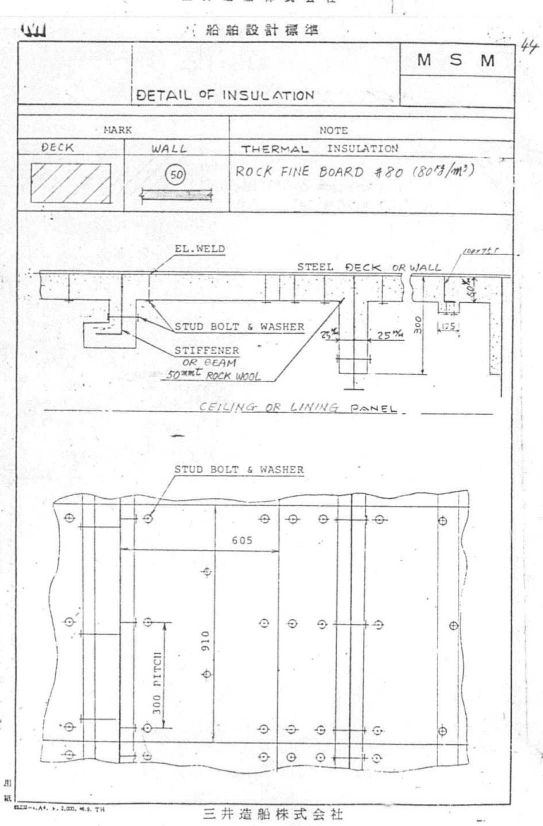

43
防熱床張詳細
DETAIL OF INSULATED FLOOR
MARK; ⑥ ⑦
2m/m t VINYL TILE (ONLY ⑥)
6m/m t LATEX DK. COMP.
MIN. 10m/m t. PERLITE CEMENT
1.2m/m t. METAL LATH
⑦ NO VINYL TILE
CLIP (P. = abt. 500)
abt. 25
STEEL DECK
5m/m t. PERLITE CEMENT
50m/m t. HI-HEAT BOARD "G"
(APPROVED TYPE BY U.S.C.G.)
MARK; ⑤
2m/m t VINYL TILE
6m/m t LATEX DK. COMP.
ANCHOR CLIP (NO. = abt. 10 PIECES/M²)
PERLITE CEMENT
STEEL DECK
BOUNDARY PART OF MARK ⑤ & ⑥
MARK; ⑤
MARK; ⑥


船舶設計標準
M S M
44
DETAIL OF INSULATION
MARK
NOTE
DECK
WALL
THERMAL INSULATION
50
ROCK FINE BOARD #80 (80kg/m³)
EL. WELD
STEEL DECK OR WALL
STUD BOLT & WASHER
STIFFENER OR BEAM
50mm t ROCK WOOL
CEILING OR LINING PANEL
STUD BOLT & WASHER
605
910
300 PITCH
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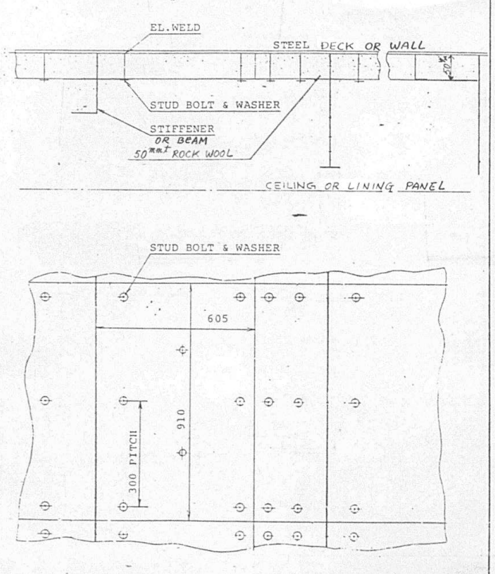
船舶設計標準 45

DETAIL OF INSULATION

M S M

MARK		NOTE
DECK	WALL	THERMAL INSULATION
	50	ROCK FINE BOARD #80 (80kg/m³)



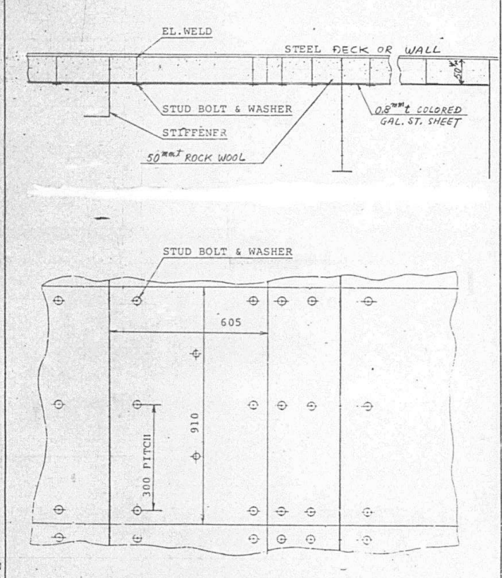
三井造船株式会社

船舶設計標準 46

DETAIL OF INSULATION FOR DECK

M S M

MARK		NOTE
DECK	WALL	THERMAL INSULATION
	50	ROCK FINE BOARD #80 (80kg/m³)



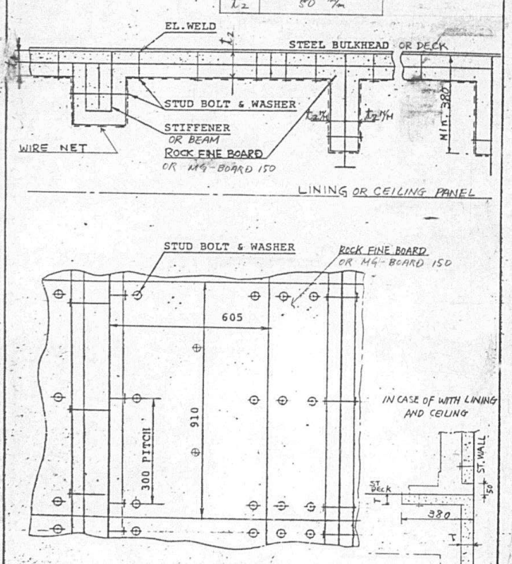
三井造船株式会社

船舶設計標準 47

DETAIL OF INSULATION

M S M

MARK		NOTE	
DECK	WALL	A-60 CLASS INSULATION	
	t	BRAND NAME	ROCK-FINE BOARD (W-18) 120kg/m³ (ASAHI ASBESTOS MAKE)
		THICKNESS t_1	100 mm
		t_2	50 mm



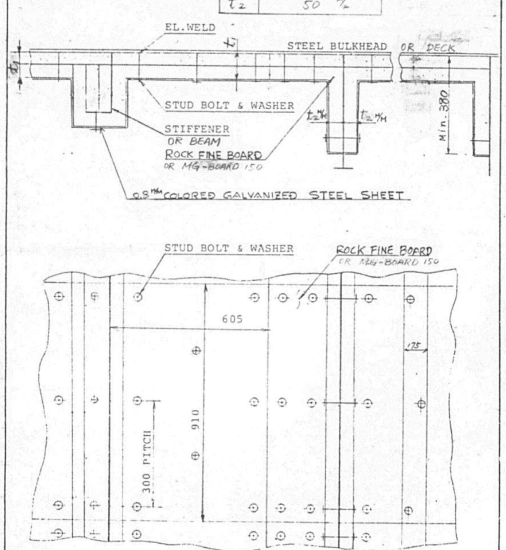
三井造船株式会社

船舶設計標準 48

DETAIL OF INSULATION

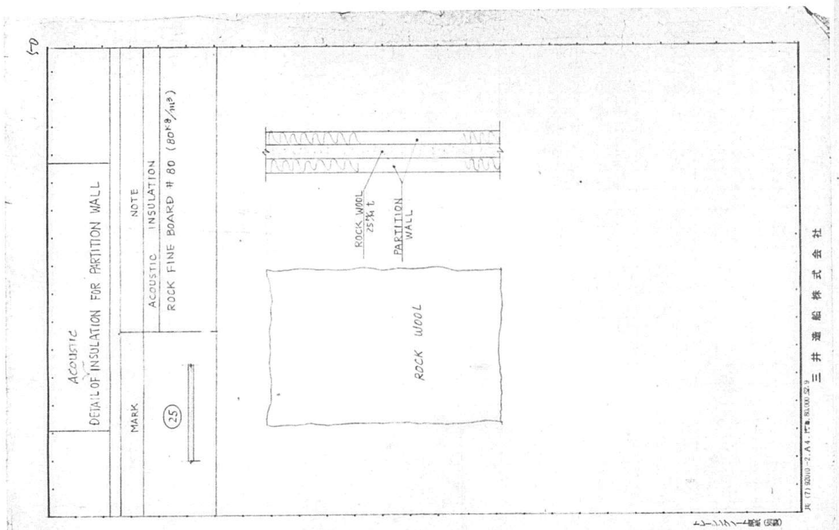
M S M

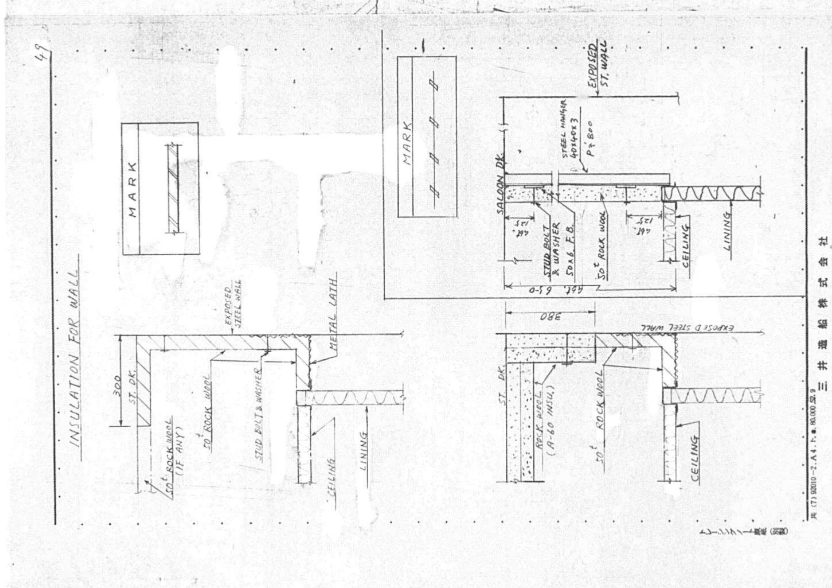
MARK		NOTE	
DECK	WALL	A-60 CLASS INSULATION	
	t	BRAND NAME	ROCK-FINE BOARD (W-18) 120kg/m³ (ASAHI ASBESTOS MAKE)
		THICKNESS t_1	100 mm
		t_2	50 mm

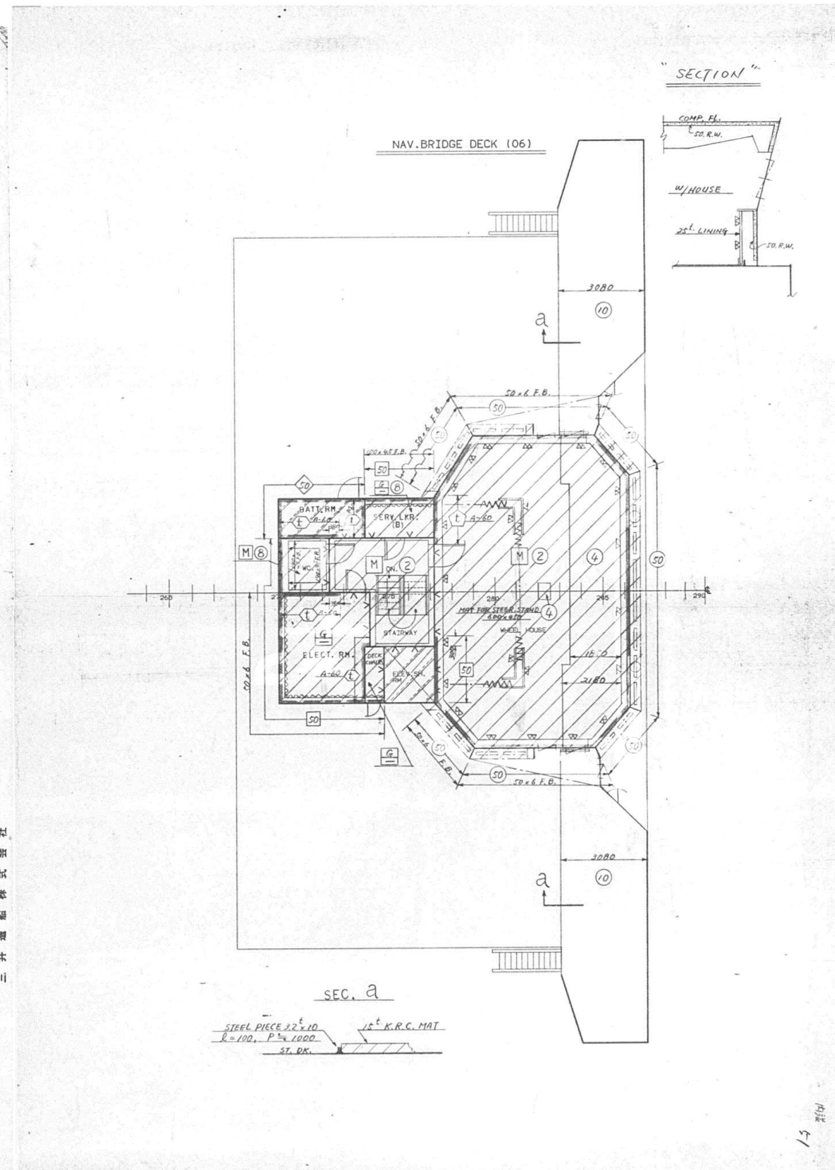


三井造船株式会社

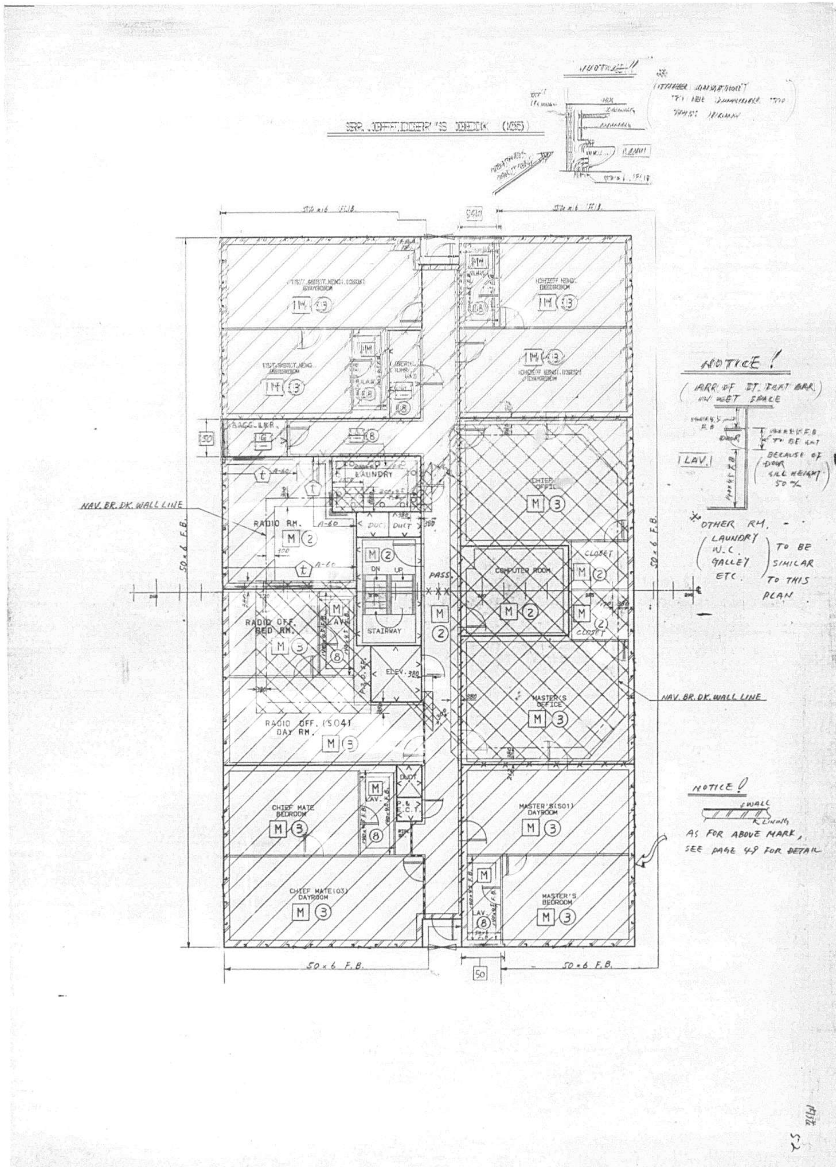
1267


Acoustic
DETAIL OF INSULATION FOR PARTITION WALL
MARK
NOTE
ACOUSTIC INSULATION
ROCK FINE BOARD # 80
ROCK WOOL
PARTITION WALL
三井造船株式会社

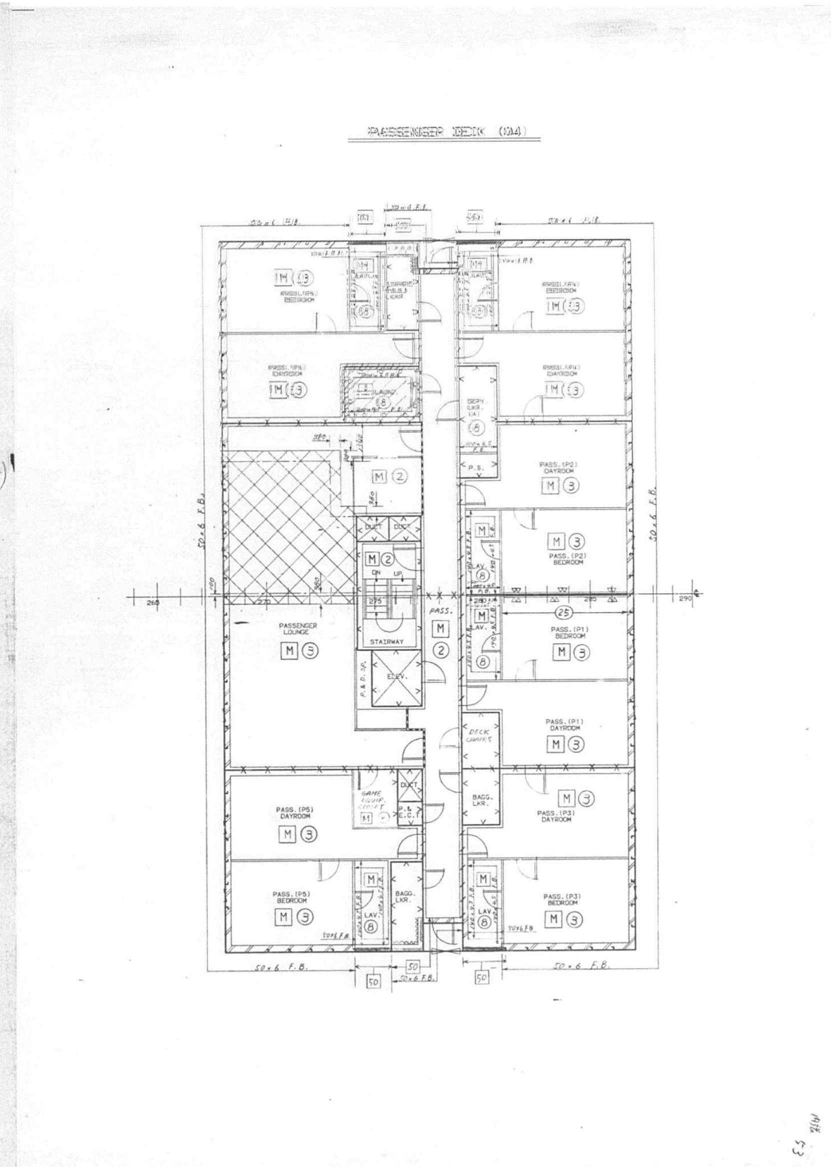

INSULATION FOR WALL
MARK
SALOON DK
EXPOSED ST. WALL
METAL LATH
ST. DK
CEILING
LINING
三井造船株式会社


"SECTION"
NAV.BRIDGE DECK (06)
W/HOUSE
ELECT. RM.
STAIRWAY
SEC. a
ST. DK.

1268



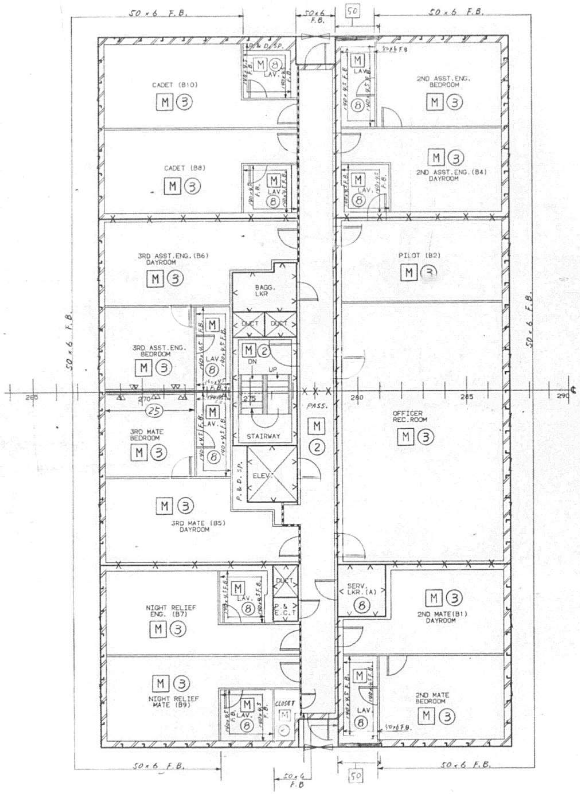
NOTICE!
OTHER RM. (LAUNDRY W.C. GALLEY ETC.) TO BE SIMILAR TO THIS PLAN
NAV. BR. DK. WALL LINE
RADIO RM.
LAUNDRY
STAIRWAY
COMPUTER ROOM
MASTER'S OFFICE
RADIO OFF. (S04) DAY RM.
CHIEF MATE BEDROOM
MASTER'S (S01) DAYROOM
CHIEF MATE (03) DAYROOM
MASTER'S BEDROOM
NOTICE!
AS FOR ABOVE MARK, SEE PAGE 48 FOR DETAIL
50×6 F.B.



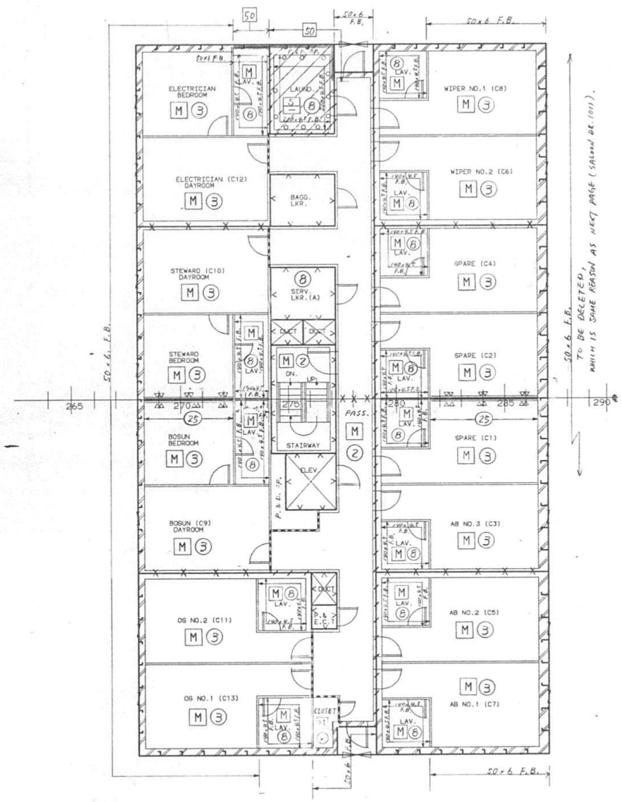
PASSENGER DECK (04)
PASSENGER LOUNGE
STAIRWAY
PASS. (P2) DAYROOM
PASS. (P2) BEDROOM
PASS. (P1) BEDROOM
PASS. (P1) DAYROOM
PASS. (P5) DAYROOM
PASS. (P3) DAYROOM
PASS. (P5) BEDROOM
PASS. (P3) BEDROOM
50×6 F.B.

1269

BOAT DECK (03)

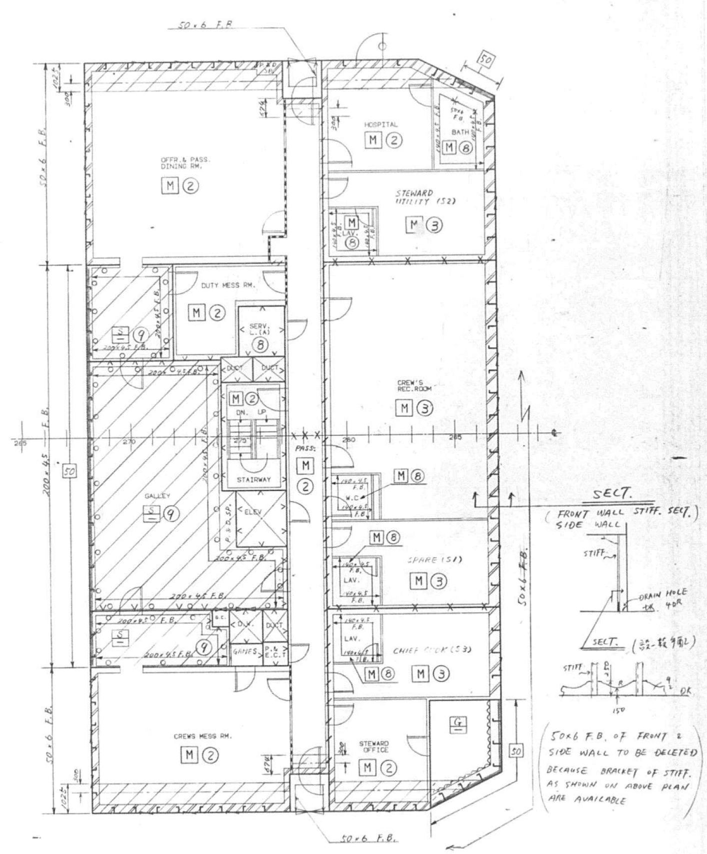


CREW DECK (02)

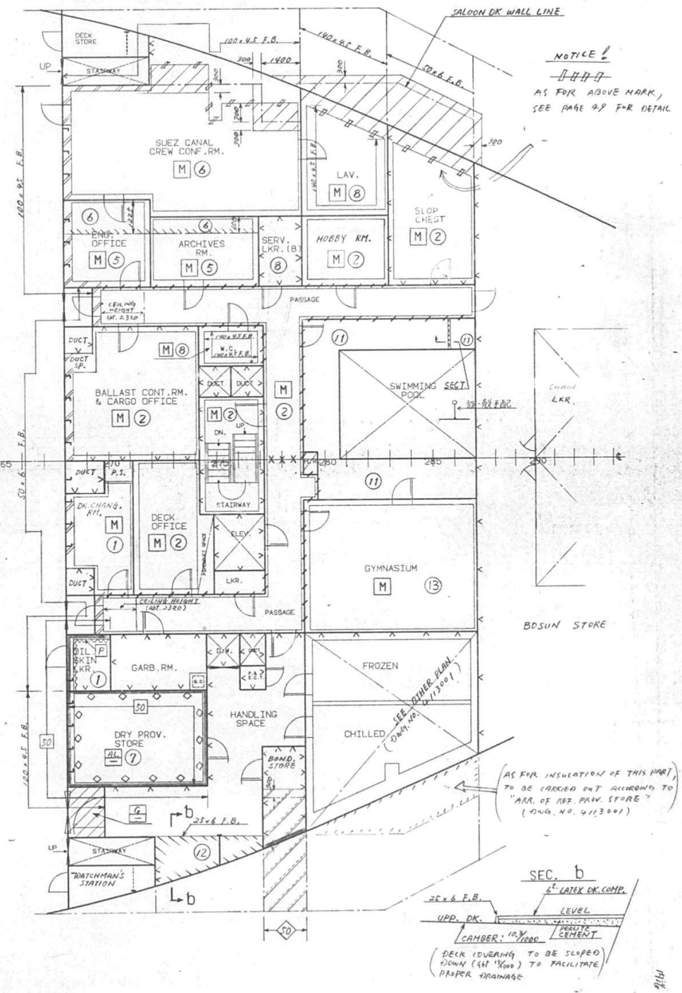


1270

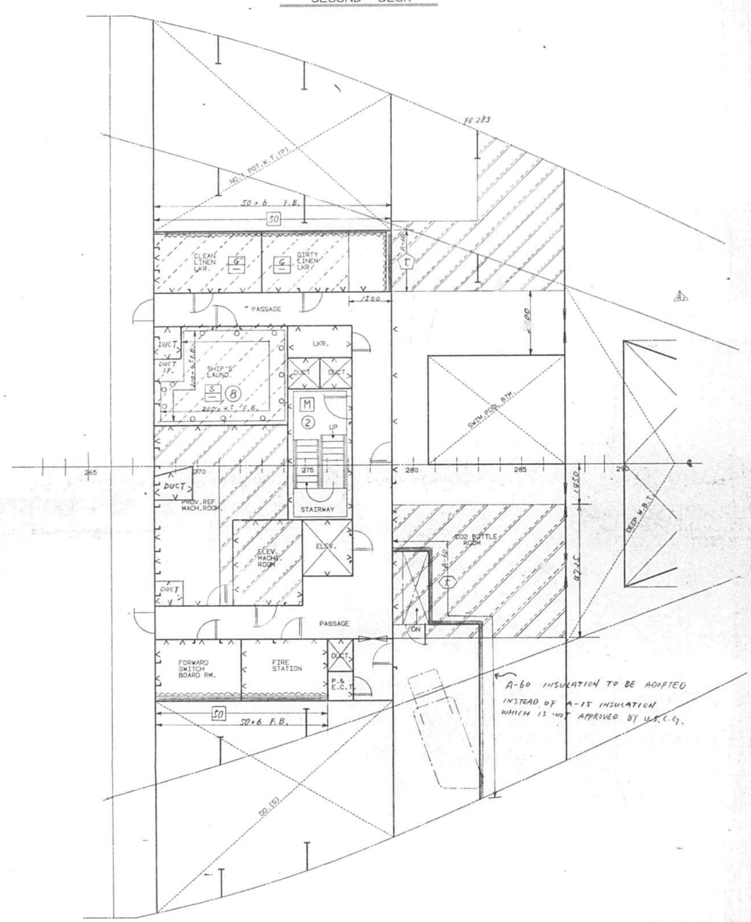
SALOON DECK (01)

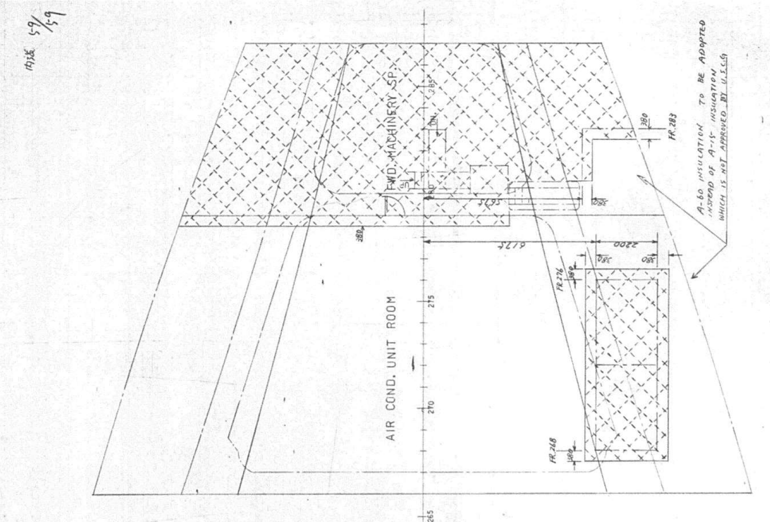


UPPER DECK



SECOND DECK





1272

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL								

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

ELECT. OUTFIT., DESIGN SEC.

DETAIL OF JOINER WORK IN ENGINE CONTROL ROOM

機関制御室 内張り要領図

LYKES REF. NO. 330103 — MITSUI DRAWING NO. SK-F-014

TS1323/24/25

(9 SHEETS WITH COVER)

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
		PREPARED FOR SNO 1325 AS FINISHED PLAN, MADE APPLICABLE TO SNO 1323/4.	NOV. 17, 86' S. I.

TS1323/4/5 DWG NO SK-F-014 2

MAKER'S LIST FOR THERMAL ACOUSTIC & FIRE INSULATION IN ENG. CONTROL ROOM

ITEM	APPLICATION	BRAND NAME	MAKER	CERT. NO.
FIRE INSULATION (AROUND ESCAPE TRUNK)	A-60 FIRE INSULATION	ROCK-FINE BOARD (# 120) W-18	ASAHI ASBESTOS CO, LTD. (JAPAN)	AB : SEE PAGE 7 & 8A USCG : 164.007/54/0 PAGE 9
		MG-BOARD 150 (# 137.5)	NICHIAS CORPORATION (JAPAN)	USCG : 164.007/57/0 PAGE 8B
THERMAL & ACOUSTIC INSULATION	NON-COMBUSIBLE MATERIAL	ROCK-FINE BOARD (# 80)	ASAHI ASBESTOS CO, LTD.	AB : KS/my, T-15-2 PAGE 10 USCG : 164.009/216/0 PAGE 11
		MARILITE G-PH (ASBESTOS FREE BOARD WITH COAT)	ASAHI ASBESTOS CO, LTD.	AB : KS/mk, T-15-2 PAGE 14 USCG : 164.009/246/0 PAGE 15
		MARILITE G-P (ASBESTOS FREE BOARD)	ASAHI ASBESTOS CO, LTD.	AB : KS/mk, T-15-2 PAGE 14 USCG : 16714/164.009 General PAGE 16

TS1323/4/5 DWG NO SK-F-014 3

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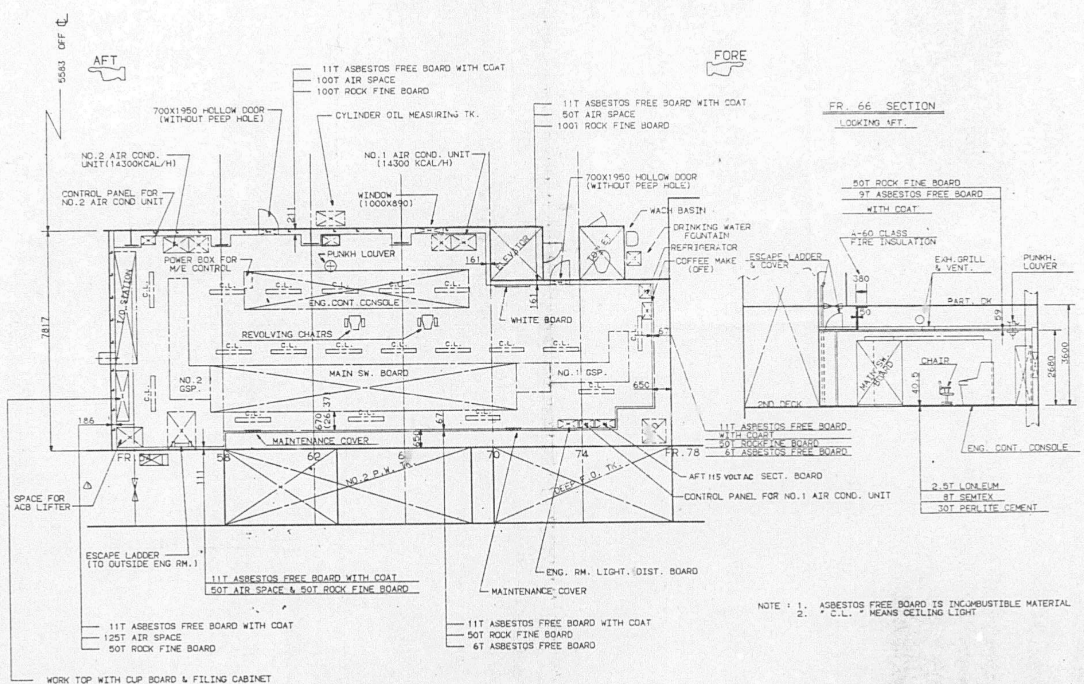
ARRANGEMENT OF ENGINE CONTROL ROOM PLAN

(FRAME SPACE 800) SCALE 1/100



NOTE : 1. ASBESTOS FREE BOARD IS INCOMBUSTIBLE MATERIAL
2. " C.L. " MEANS CEILING LIGHT

1. INSULATION OF ENGINE CONTROL ROOM

1:01 INSULATION FOR HEAT AND SOUND

(1) Engine control room

Material of insulation shall be as follows. (See Fig. 1:01-1)

a) Floor

LONLEUM	2.5mm	Color : GRAY (32) (SIMILAR TO MATICO'S" 5519)	
SEMTEX	8 mm		
Mortar	30 mm		

b) Wall ... ASAHI MARILITE G WITH MELLANITTO NTA

Asbestos free board with laminated plastic sheet	11 mm	Color : LIGHT CLEAM (S170-U) (MELANITTO N-63G)
Rock wool	25 - 100 mm	

c) Ceiling ... ASAHI MARILITE G WITH MELLANITTO NTA

Asbestos free board with laminated plastic sheet	9 mm	Color : IVORY WHITE (MELANITTO N-2G)
Rock wool	50 mm	

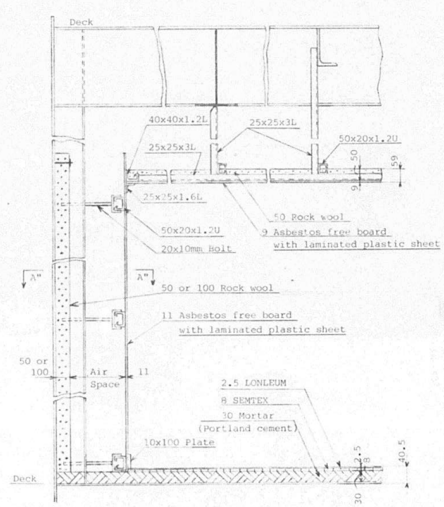


Fig. 1:01-1 Typical detail of floor, ceiling and wall for engine control room

1274

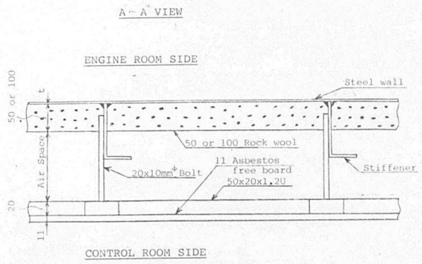


Fig. 1:01-2-1 Typical detail of wall facing E/R

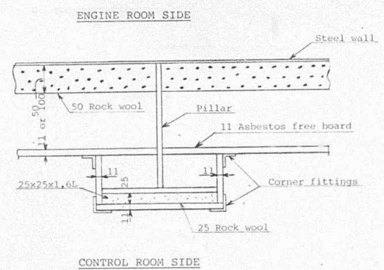
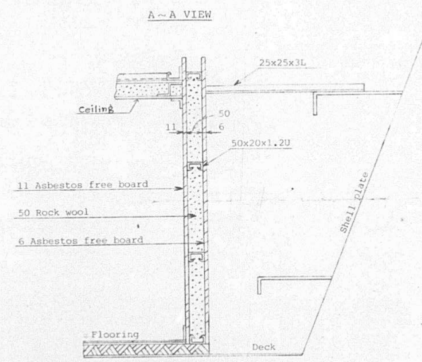


Fig. 1:01-2-2 Typical detail around pillar



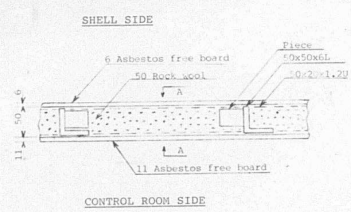


Fig. 1:02 Typical detail of side wall

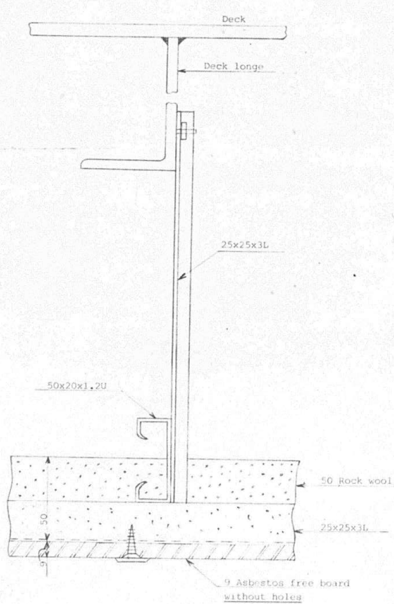


Fig. 1:0 3 Detail of attachment to deck for ceiling

1/21

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	APRIL/8/85 MAY/1/85	DISCUSS. MEMO OFT/MES-372	APRIL 18 1985	M-00360	JULY/4 1985	T-8-2		
A	JULY/3 1985	OFTS/MES-652						

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION SEC. CHIEF

採光装置及び諸室入口戸配置
ARRANGEMENT OF ACCOMM. DOOR & WINDOW

DATE (TEL.2235)

JOB NO. TS1323/24/25 — SCALE 1/100 — LYKES REF. NO. 330104 — MITSUI DRAWING NO. 4111035

(21 SHEETS WITH COVER)

ABS N.Y. 1
ABS TOKYO 1/1
USCG MMT 4/1
OFT 3/1

2/21

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5. OCT. 1986	PREPARED FOR S. NO. 1323 AS FINISHED PLAN; MADE APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	T. Sako

3/21

GENERAL NOTE

1. ASSUMED FREEBOARD DECK OF THIS SHIP IS 2ND DK. LEVEL
2. ALL SERVICE LOCKER (A) & (B) SHOULD HAVE DOOR LOCKS TO SAME KEY
3. CLEAN LINEN LOCKER (110), DIRTY LINEN LOCKER (109) AND SHIP'S LAUNDRY (111) SHOULD HAVE SAME KEY.
4. DOOR (722) (626) (419) TO DECK LAUNDRY SHOULD HAVE SAME KEY
5. SLOP CHEST, PROV. STORE AND BONDED STORE SHOULD HAVE HASP AND PAD LOCK FOR CUSTOMS SEAL.
6. FIRE STATION DOOR NO. 102, CO_2 ROOM DOOR NO. 106 AND SUEZ CANAL CREW CONF. ROOM DOOR NO. 221 SHOULD HAVE BREAK GLASS KEY BOX FOR EMERGENCY USE.

DWG. NO. 4111035

4/21

REFERENCE

NO.	REF. NO	DWG NO	DWG NAME
1	930009	4109101	CONSTRUCTION OF FIRE PROTECTION
2	360601	4109103	RAT PROOFING
4	120402	4111042	MASTER KEY SYSTEM
5	160204	4120210	ARR. OF SMALL HATCH & DOOR
6	330604	4111037	HOLLOW DOOR
7	120303	4114205	SIDE SCUTTLE & SQURE WINDOW

DWG. NO. 4111035

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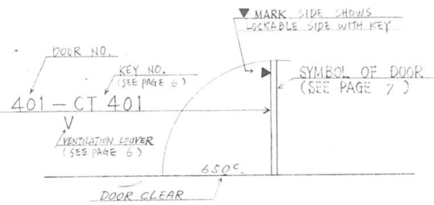
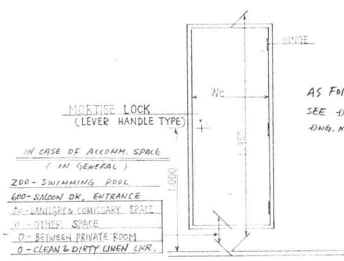
(A) ACCOMMODATION DOOR



(B) TYPICAL PLAN OF DOOR



AS FOR DETAIL OF SILL HEIGHT, SEE DRAWING " HOLLOW DOOR " DWG. NO. 4111037.

) GENERAL REMARKS FOR DOOR

1. REFER TO FOLLOWING DRAWINGS
   a). ARRANGEMENT OF SMALL HATCH & STEEL DOORS (DWG. NO. 4120210)
2. DOOR NO. , KEY NO. , AND MARKS ARE AS FOLLOWS.
   a). "DOOR NO." IS SHOWN ON THE FOLLOW LIST

DOOR NO.	DOOR NO.
801:~ NAV. BRI. DECK (06)	201:~ UPPER DECK
701:~ SR. OFFR'S DECK (05)	101:~ SECOND DECK
601:~ PASSENGER DECK (04)	001:~ OTHER DECK
501:~ BOAT DECK (03)	
401:~ CREW DECK (02)	
301:~ SALOON DECK (01)	

   b). "KEY NO." IS SHOWN ON THE FOLLOW
      1. CT=000 ; MORTISE CYLINDER LOCK WITH THUMBTURN
      2. ST=000 ; MORTISE RODKEY LOCK WITH THUMBTURN
      3. L ; MORTISE LATCH
      4. IL ; MORTISE LATCH WITH INDICATOR
      5. C=000 ; MORTISE CYLINDER LOCK
   c). MARKS ARE AS FOLLOWS
      1. V ; VENTILATION LOUVER (AREA 0.027m²)
      2. V ; VENTILATION LOUVER (AREA 0.047m²)
      3. D ; DOOR CLOSER (ADJUSTABLE TYPE)
      4. ※D ; DOOR CLOSER & MAGNETIC CATCHER (DOOR SHALL BE CLOSED FROM WHEEL HOUSE)

) MASTER KEY SYSTEM

GRAND MASTERKEY
- SUB MASTERKEY — FOR MASTER'S ROOM (MARK= M)
- SUB MASTERKEY — FOR DECK DEPARTMENT (MARK= D)
- SUB MASTERKEY — FOR ENG. DEPARTMENT (MARK= E)
- SUB MASTERKEY — FOR STEWARD DEPART. (MARK= S)

MASTERKEY ——— FOR STICKKEY

1. THREE (3) MASTERKEYS TO BE SUPPLIED.
2. THREE (3) SET OF KEYS TO BE SUPPLIED FOR EACH LOCK.
3. SAME KEY TO BE APPLIED TO THE SAME NUMBER OF KEYS SHOWN ON THE PLAN.

NOTE: AS FOR DETAIL OF MASTER KEY SYSTEM, SEE OTHER PLAN (DWG. NO. 4111042) " MASTER KEY SYSTEM " — TO BE SUBMITTED FOR OWNER'S APPROVAL

SYMBOL	TYPE	NOTE
A-60	FIRE-PROOF DOOR CLASS A-60 (STEEL HOLLOW DOOR)	ABS. APPROVED TYPE
A	FIRE-PROOF DOOR CLASS A-0 (STEEL HOLLOW DOOR)	ABS. APPROVED TYPE
B	FIRE-PROOF DOOR CLASS B-0 (STEEL HOLLOW DOOR)	ABS. APPROVED TYPE
S	STEEL HOLLOW DOOR	
Aℓ	WEATHERTIGHT al. HOLLOW DOOR	
A-0	FIRE-PROOF DOOR CLASS A-0 (STEEL HOLLOW GAS TIGHT DOOR)	ABS. APPROVED TYPE
Aℓ	Aℓ HOLLOW SLIDING DOOR WITH SQUARE GLASS	
	STEEL DOOR	SEE OTHER PLAN (DRW. NO. 4120210)
	STEEL DOOR WITH PEEP WINDOW	SEE OTHER PLAN (DRW. NO. 4120210)

NOTE ;
1. ONLY "A" CLASS AND "B" CLASS DOOR TO BE MADE IN ACCORDANCE WITH C.F.R 46 SHIPPING CHAPTER I § 72.05-25.
   1) "A" CLASS DOOR
      DOOR LATCH THROW : 20 m/m (MIN.)
   2) "B" CLASS DOOR
      DOOR LATCH THROW : 10 m/m (MIN.)

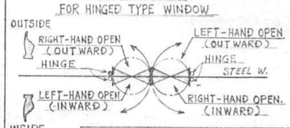
注；

1. 丸窓 および 角窓 の 取付位置は 別図「諸室配置」(4110001 ～)を参照のこと。
2. 図中"L"は「左開き」、"R"は「右開き」、"F"は「固定」 および "HU"は「ヒンジアップ」を示す。
3. 窓枠取付は スタッドボルト(E.W.)を使用する。
4. 庇および眉は取付けない。

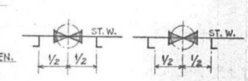
NOTE ;

1. REFER TO FOLLOWING PLAN "ACCOMMODATION PLAN" (DWG. NO. 4110001～8)
2. THE SIGN "L" OR "R" DENOTES LEFT OR RIGHT-HAND OPENING RESPECTIVERY AND "F" FIXED TYPE.
3. WELDED STUD BOLTS TO BE USED FOR THE FITTING OF WINDOW FRAMES.
4. VISOR OF EYEBLOW SHALL NOT BE PROVIDED

WAY OF OPEN FOR HINGED TYPE WINDOW



POSITION OF WINDOW CENTER AT BETWEEN STIFFENERS (※ EXCEPT SPECIALLY MENTIONED)



丸窓 および 角窓 取付高さ
FITTING HEIGHT OF WINDOWS (AT CENTER)

取付場所 LOCATION	甲板間高さ DK. HEIGHT	鋼甲板上取付高さ ABOVE STEEL DK
WHEEL HOUSE	2600	1550 m/m
SR. OFFR'S. DK (05)	2700	BED RM. ONLY 1550 OTHER 1365
PASSENGER DK (04)	〃	〃
BOAT DECK (03)	〃	〃
CREW DECK (02)	〃	〃
SALOON DECK (01)	〃	〃
UPPER DECK	3,050	1,550

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丸窓及び角窓

LIST OF SIDELIGHTS & RECTANGULAR WINDOWS

符号 Symbol	図番 Drg. No.	項目 Item 形式 Type	大きさ(m/m) Size	ガラス厚さ Thick of Glass	開き方向 Open Side	数量 QUANTITY 透明ガラス Clear Glass	スリガラス Frosted Glass	合計 Total	記事 Remarks
▭		FIXED RECTANGULAR WINDOW (WITH WIPER)	2200 × 700	12		1		1	
			ABT. 875×810 ×700	10		2		2	
▭		FIXED REC. WINDOW (WITH 350φ C.V.S)	800 × 700	10		2		2	
▭		FIXED RECTANGULAR WINDOW	800 × 700	10		4		4	WHEEL HOUSE
			665 × 700	10		1		1	
⋈			600 × 700	10		2		2	
			550 × 700	10		2		2	
▭		FIXED RECTANGULAR WINDOW (TYPE ▢)	ABT. 710×615 ×700 ~ ABT. 950×805 ×700	10		10		10	
⌐		HINGED RECTANGULAR WINDOW	450 × 600	10	R	1		1	SALOON DECK(01) CREW MESS RM.
				10	L	1		1	SALOON DECK(01) OFFR & PASS. DINING RM.
⌐		FIXED RECTANGULAR WINDOW	450 × 600	10		101		101	SR. OFFR'S DECK 26; PASS. DECK 22; BOAT DECK 19; CREW DECK 16; SALOON DECK 18
⌐		FIXED RECTANGULAR WINDOW	1000 × 700	10		2		2	UPP. DK. GYMNASIUM

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材質

LIST OF MATERIAL

SIDELIGHTS		
Item	Fixed Type	Hinged Type
Window Frame	Bronze	Bronze
Glass Frame	-	Do.
Dog Bolt & Ring Nut	-	Do.
Welded Stud Bolt & Nut	Steel (Galvanized)	Steel (Galvanized)
Packing	Neoprene	Neoprene

RECTANGULAR WINDOWS (FOR WHEEL HOUSE) (IN ACCORDANCE WITH MAKER'S STANDARD)

Item	Fixed Type	Hinged Type
Window Frame	BRASS	
Glass Frame	-	Do.
Dog Bolt & Ring Nut	-	Do.
Flat Head Bolt & Nut	BOLT: NICKEL PLATED STEEL NUT: NICKEL PLATED STEEL	
Packing	Neoprene	Neoprene

RECTANGULAR WINDOWS (FOR EACH CABIN) (IN ACCORDANCE WITH MAKER'S STANDARD)

Item	Fixed Type	Hinged Type
Window Frame	BRASS	BRASS
Glass Frame	—	DO.
Dog Bolt & Ring Nut	—	DO.
Welded Stud Bolt & Nut	BOLT: NICKEL PLATED STEEL NUT: NICKEL PLATED STEEL	BOLT: NICKEL PLATED STEEL NUT: NICKEL PLATED STEEL
Packing	Neoprene	Neoprene ⚠

All Glass	TRANSPARENT TOUGHENED SAFETY GLASS (HEAT TREATED GLASS)
Mosquito Net (For Hinged Type)	Flame : —— Net : ——

天窓及びエアーハッチ

LIST OF SKY-LIGHT & AIR HATCH

図番 Drg. No.	名称 Name	大きさ Size (m/m)	数量 Q'ty	記事 Remarks

S. (414000/)

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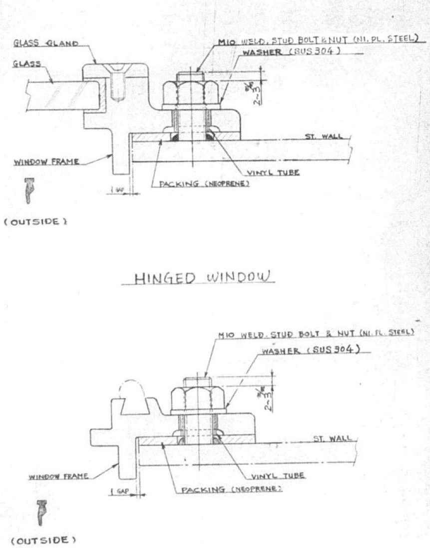
FITTING METHOD OF RECTANGULAR WINDOWS

FIXED WINDOW

HINGED WINDOW



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備品目録

LIST OF EQUIPMENT

図番 Drg. No.	名称 Name	数 No.	記事 Remarks
	角窓用遮光板 ABT. 800×700 SUN SHADE SCREEN (SKY BLUE #301)	1	WHEEL HOUSE

(STOWAGE TO BE ARRANGED)

予備品目録

LIST OF SPARE PARTS

注文図番	名称 Name	数 No.	記事 Remarks
	SPARE GLASS FOR 450×600 REC. WINDOW (HEAT TREATED GLASS)	2	TRANSPARENT TOUGHENED SAFETY GLASS (10t)

S. (414000/)

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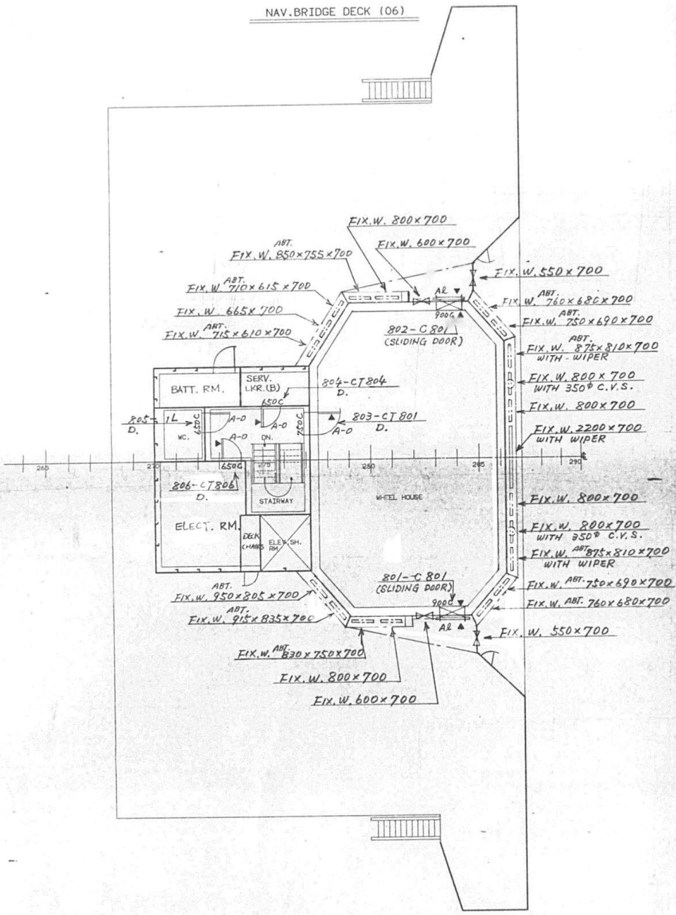
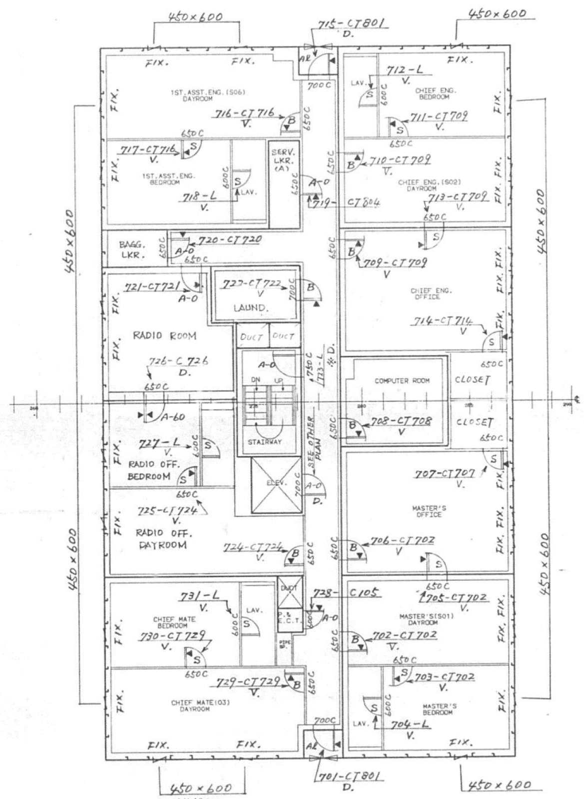
NAV.BRIDGE DECK (06)

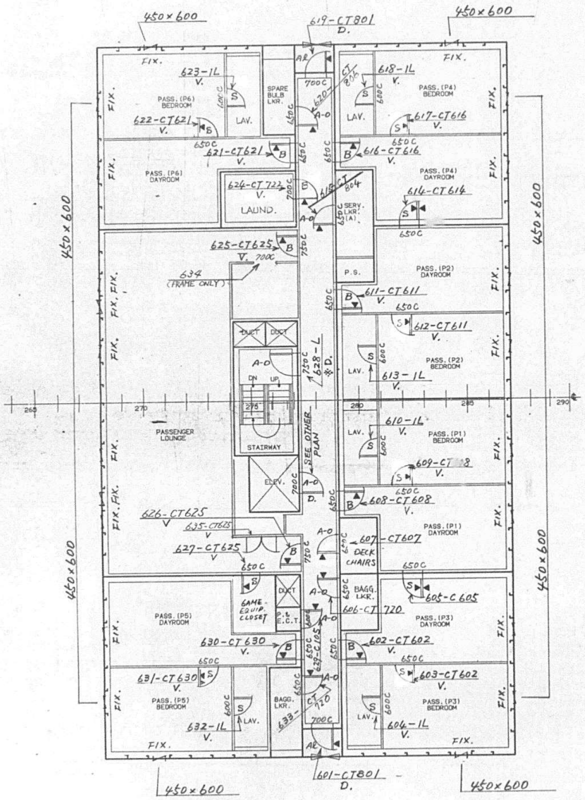


SR.OFFICER'S DECK (05)

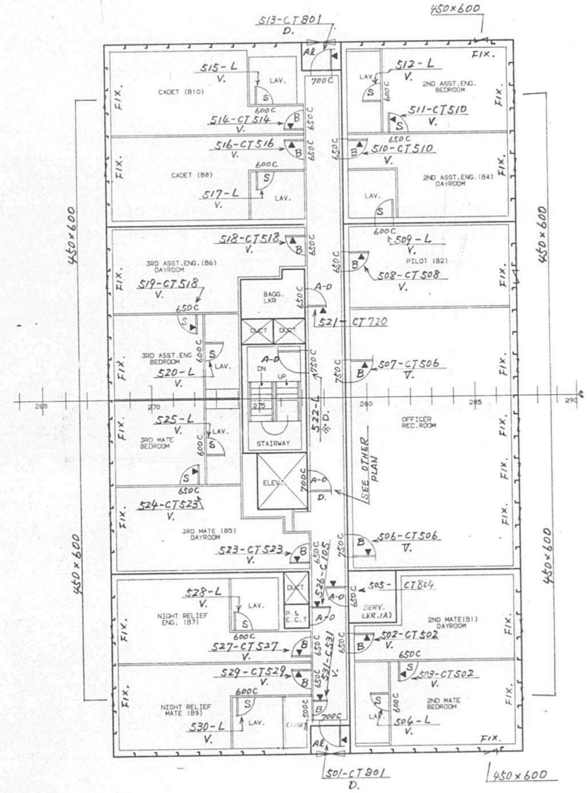


1279

PASSENGER DECK (04)



BOAT DECK (03)



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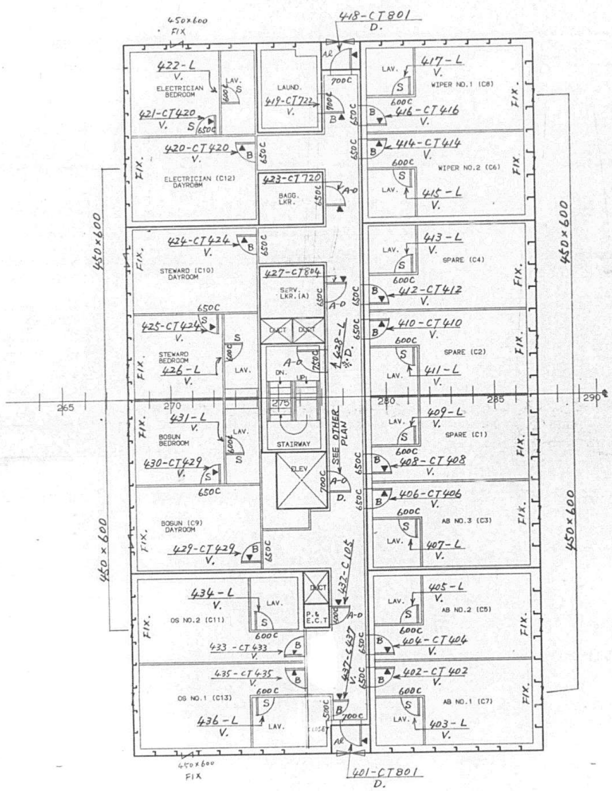
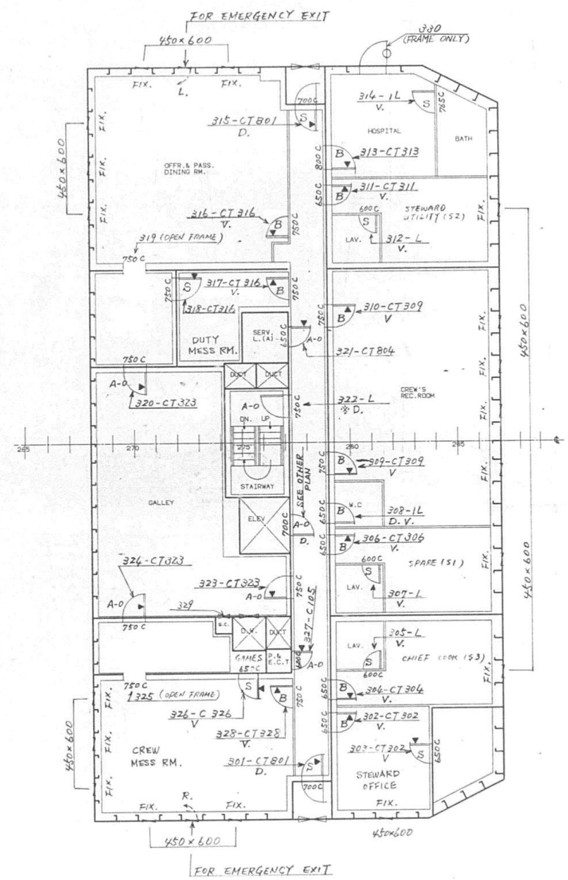
CREW DECK (02)

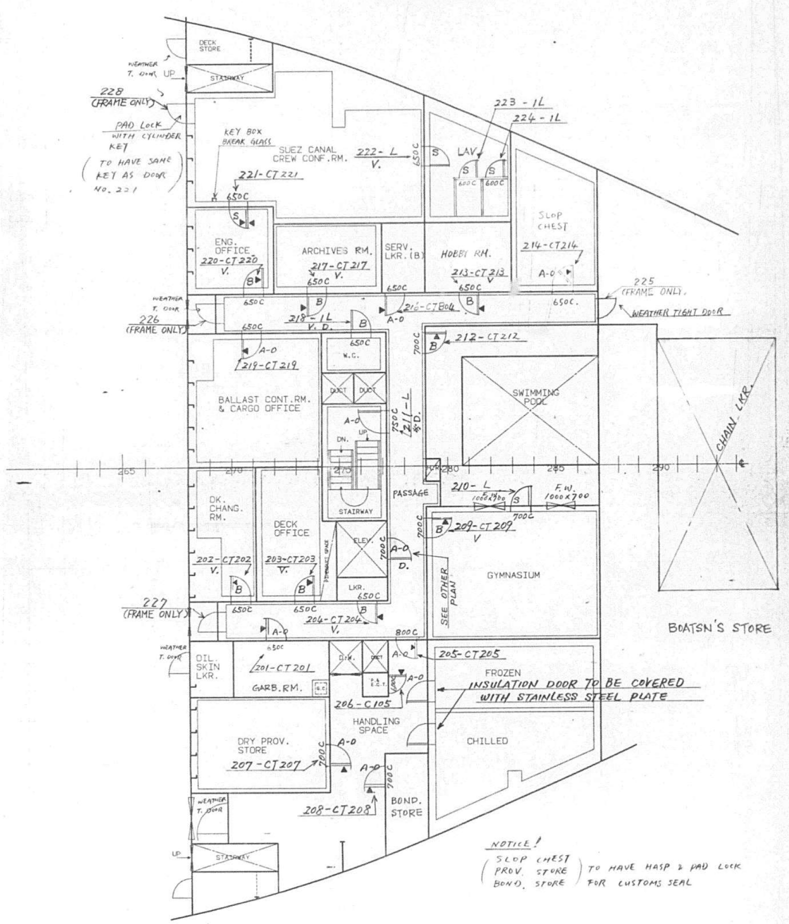


SALOON DECK (01)

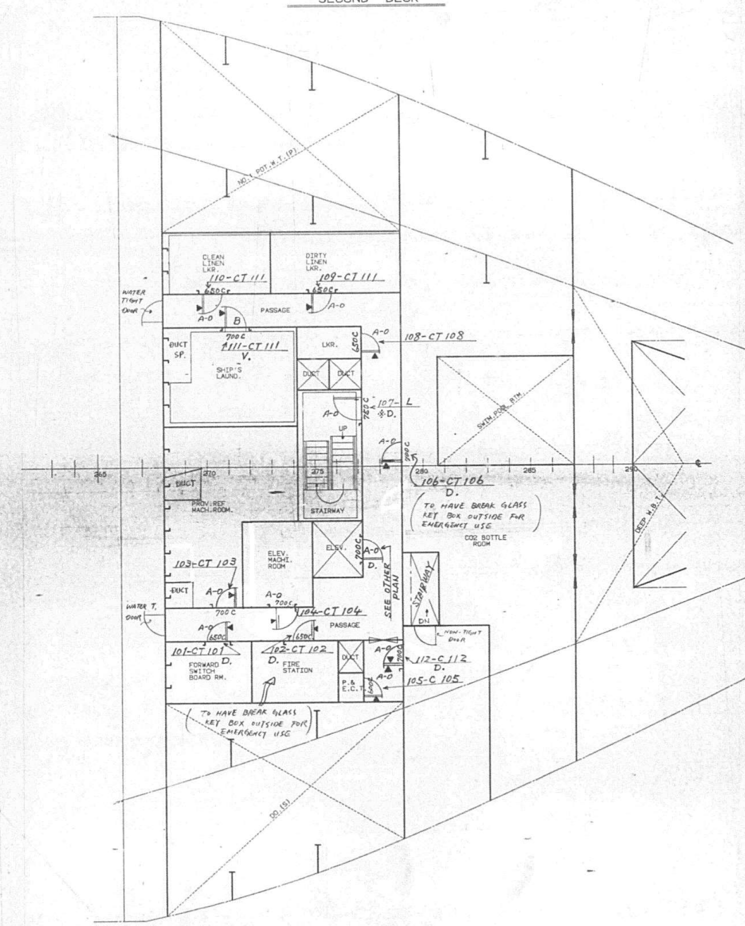


1281

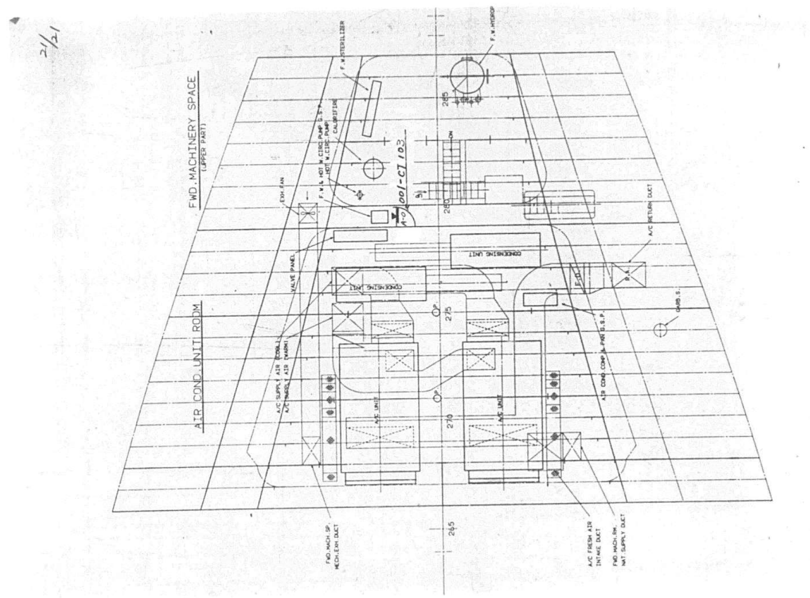
UPPER DECK



SECOND DECK



1282



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APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	JAN/6 1986	TAM/143						

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO. NO.1325
SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC.CHIEF

室内木工備品
MISCELLANEOUS JOINER FITTINGS

MITSUI ENGINEERING & SHIPBUILDING CO., LTD. SHIP DESIGN DEPARTMENT MAR 5.1987

DATE (TEL 2236)

JOB NO. TS1323/24/25
JOBCLASSIF.NO. D.11
SCALE
LYKES REF. NO. 330106
MITSUI DRAWING NO. 4111047

(1/2 SHEETS WITH COVER)

2

PLAN RECORD			
REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5.OCT. 1986	PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325.	T. Lkota

GENERAL NOTE	
1	REFER TO FOLLOWING PLAN
	(1) STEEL FURNITURE (DWG NO. 4111027)

DWG.NO. 4111047

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S. NO. PAGE

番号 NO	名称 ARTICLE	図面番号 DRAWING NO	形状大きさ FEATURE	材質 MATERIALS	1隻分個数 NO PER SHIP	関係工場 SHOP	使用個所 USE	備考 REMARKS
1	禁煙札 PLACARD FOR NO SMOKING (B)	SD 44865-B	450 × 120	SOFT WOOD WHITE PAINTED	1		CONTACT WITH SUPERVISOR	LETTER NO SMOKING (IN RED)
2	乗船禁示札 PLACARD FOR NO ADMITTANCE (B)	SD 44867-B	〃	〃	1		〃	LETTER NO ADMITTANCE (IN RED)
3	掃除具箱 BROOM BOX	SD 44856	PAD LOCK 1,500 × 550 × 575, WITH LETTING PIECE 据止金物を付	〃	1		〃	
4	寒暖計箱 THERMOMETER BOX	SD 44852 に做う	455, 100, 200, LOUVER Ⓐ	SOFT WOOD WHITE PAINTED	1		NAV. BRI. DK. (S. SIDE)	POSITION OF THEM. BOX, NAV. BR. DK. WING Ⓐ
5								
6	コイヤーマット台 COIR MAT STAND (A)	SD 44860-A	650 × 410, H, TOP: COIR MAT	SOFT WOOD PAINTED IN GRAY	15		PASS.	DECK / H / Q'TY: CREW DK. & ABOVE / — / ※8; SAL. DK. / 150 / 2; UPP. DK. / 250 / 3; 2ND. DK. / 90 / 2
			(※ MARK ; COIR MAT ONLY WITHOUT STAND BECAUSE OF DOOR SILL HEIGHT 80 mm)					

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S. NO. PAGE

番号 NO	名称 ARTICLE	図面番号 DRAWING NO	形状大きさ FEATURE	材質 MATERIALS	1隻分個数 NO PER SHIP	関係工場 SHOP	使用個所 USE	備考 REMARKS
9	告示板 (出船者札板) ANOUNCEMENT BOARD (B)	SD 44843-B	M.V. DOCTOR LYKES VESSEL ... 600 × 600	PLY WOOD BLACK PAINTED FOR WRITING WITH CHALK	1		ACCOMMODATION LADDER	CONTACT WITH SUPERVISOR. LETTER は PAGE 4/6 に做うこと
10	黒板 BLACK BOARD	SD 44837-A に做う	SIZE L × H × Q'TY (A) 600 × 450 × 1 (B) 850 × 600 × 2	PLYWOOD GREEN PAINTED FOR WRITING WITH CHALK	TOTAL 3			CONTACT WITH SUPERVISOR (A) BALLAST CONT. RM. (B) RADIO RM. (C) GALLEY
11	測深板 SOUNDING BOARD		650 × 850	〃	1		WHEEL HOUSE	
12	告示板 NOTICE BOARD		M.V. DOCTOR LYKES VESSEL ... 600 × 600	PLYWOOD BLACK PAINTED FOR WRITING WITH CHALK	1		CONTACT WITH SUPERVISOR	LETTER は PAGE 4/6 に做うこと
13	NOTICE FRAME		詳細は PAGE 5/6 を参照のこと		1		CONTACT WITH SUPERVISOR	
14	OFFICERS LICENSE FRAME		詳細は PAGE 6/6 を参照のこと		2		CONTACT WITH SUPERVISOR	
15	FRAME FOR USCG CERTIFICATE	SD 44836-G	B × H		4		〃	

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S. NO. PAGE

番号 NO	名称 ARTICLE	図面番号 DRAWING NO	形状大きさ FEATURE	材質 MATERIALS	1隻分個数 NO PER SHIP	関係工場 SHOP	使用個所 USE	備考 REMARKS
16	一般配置 GENERAL ARRANGEMENT	SD 44836-G	B × H	ALUMINUM FRAME	1		PASS.	(CONTACT WITH SUPERVISOR)
17	ポンピングプラン PUMPING PLAN	〃	〃	〃	1		〃	〃
18	船体容積 CAPACITY PLAN	〃	〃	〃	1		〃	〃
19	火災制御 FIRE CONTROL PLAN	〃	〃	〃	1		PASS.	
20	救命設備 ARR. OF LIFE SAVING APPLIANCE	〃	〃	〃	1		〃	
21	無線室用額 FRAME FOR WIRELESS	SD 44836-F	HINGE, HOOK, (B) × (H) 380 260	〃	1		RADIO RM.	〃
22	無線検定書額 FRAME FOR CIRTIFICATE OF WIRELESS	〃	(B) × (H) 380 260	〃	1		〃	〃
23	船舶検査証書 CERTIFICATE OF REGISTER	〃 C	(B) × (H) 290 450	〃	1		PASS.	〃

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S. NO. PAGE

番号 NO	名称 ARTICLE	図面番号 DRAWING NO	形状大きさ FEATURE	材質 MATERIALS	1隻分個数 NO PER SHIP	関係工場 SHOP	使用個所 USE	備考 REMARKS
24	ドッキングプラン DOCKING PLAN	SD 44836-G	B × H	ALUMINUM FRAME	1		PASS. (CONTACT WITH SUPERVISOR)	
25	FRAME FOR WEARING METHOD OF LIFE PRESERVER	〃	〃	〃	8		PASS. & MESS RM.	〃
26	FRAME FOR WEARING METHOD OF SERVIVAL SUITS	〃	〃	〃	8		〃	〃
27	ATTACK INSTRUCTION	〃	〃	〃	5		CONTACT WITH SUPERVISOR	
28	LIFE SAVING SIGNALS	〃	〃	〃	5		〃	
29	FRAME FOR RADIO DIRECTION FINDER	SD 44836-F	HINGE, HOOK, (B) × (H)	〃	2		W/HOUSE	
30	FRAME FOR MAGNETIC COMPASS	〃	〃	〃	1		〃	
31	FRAME FOR MANNUVERING	SD 44836-G	B × H	〃	1		〃	

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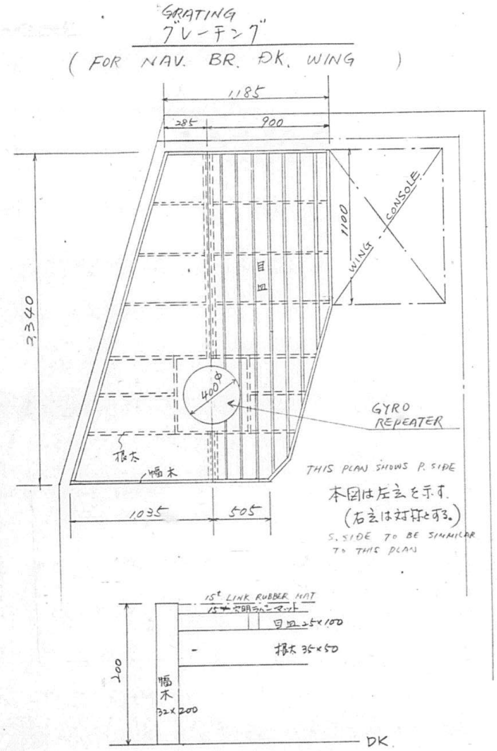
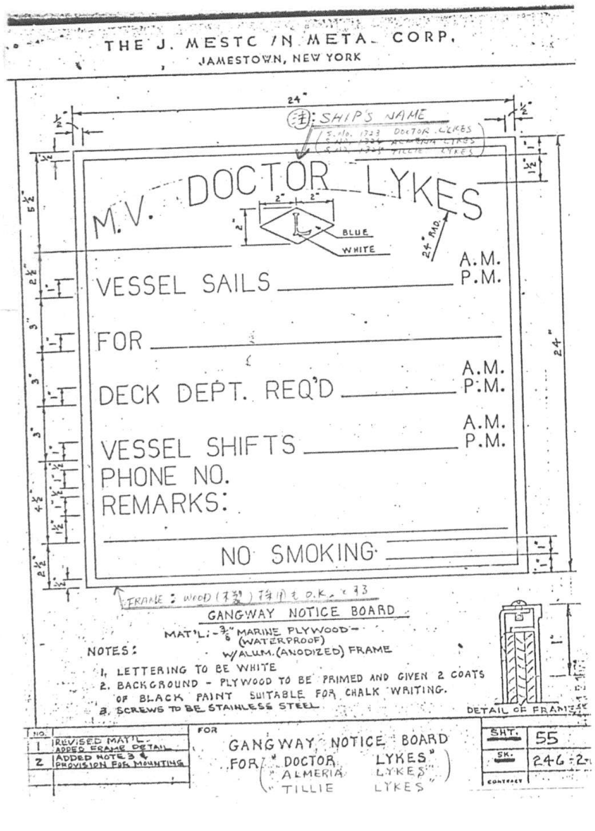
S.NO. PAGE

番号 NO	品名 ARTICLE	図面番号 DRAWING NO.	形状大きさ FEATURE	材質 MATERIALS	1隻分個数 NO. PER SHIP	関係工場 SHOP	使用場所 USE	備考 REMARKS
32	国旗箱 FLAG BOX	SD 44851	280 × 250 × 500, L	SOFT WOOD	1		CONTACT WITH SUPER-VISOR	2-FITTING PIECES 50×6 ST. F.B. TO BE PROVIDED
33	スクリュー注意板 CAUTION PLATE FOR SCREW	SD 44870-B	1,300 × 450	〃	2		ABOVE SCREW	LETTER. BEWARE OF SINGLE SCREW (IN RED)
34	コース表示板 COURSE INDICATOR	SD 44842	250 × 375	WOODEN BOARD WITH PLASTIC CARD	1 SET		WHEEL HOUSE	CARD BOX TO BE PROVIDED
35	予備品格納箱 BOX FOR SPARE PARTS	仕上色: メーカー標準(グレー) FINISHED COLOUR: MAKER'S STANDARD (GRAY)	錠前付 WITH PAD LOCK; L × B × H × Q'TY: 800 × 400 × 300 × 5; 400 × 400 × 261 × 7; 400 × 400 × 150 × 8	外面1.2t亜鉛鉄板張り 1.2m/m THICK GALV. ST. SHEET	TOTAL 20			DELIVER TO SHIP'S OFFICER

9



10



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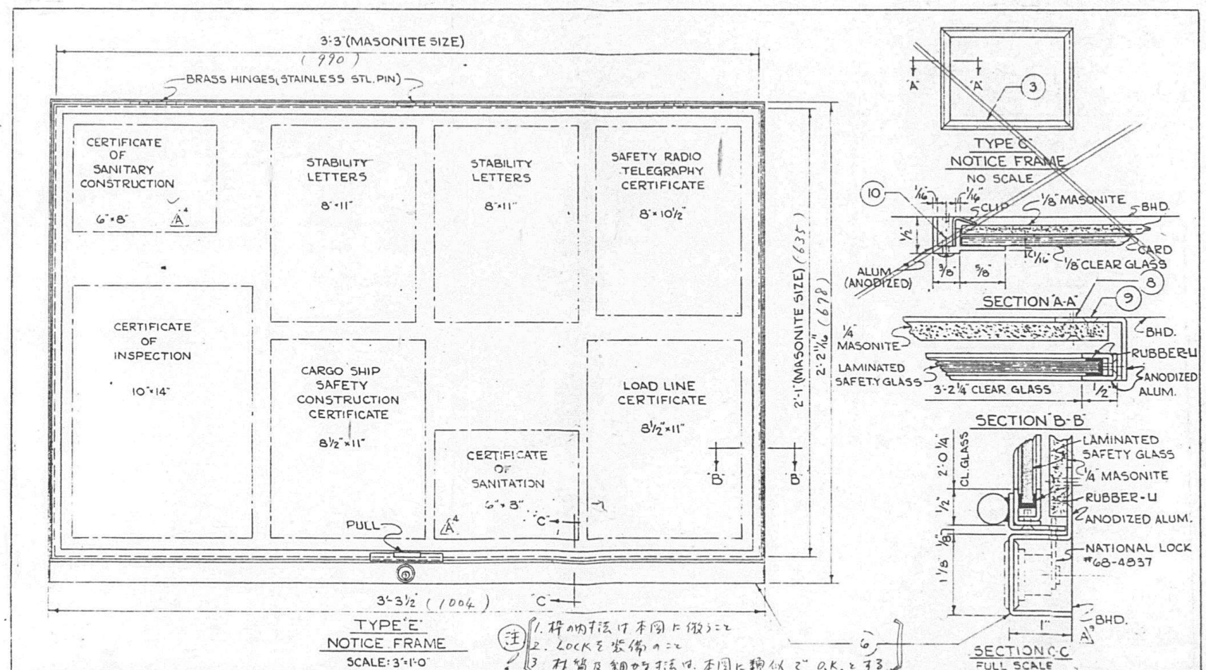
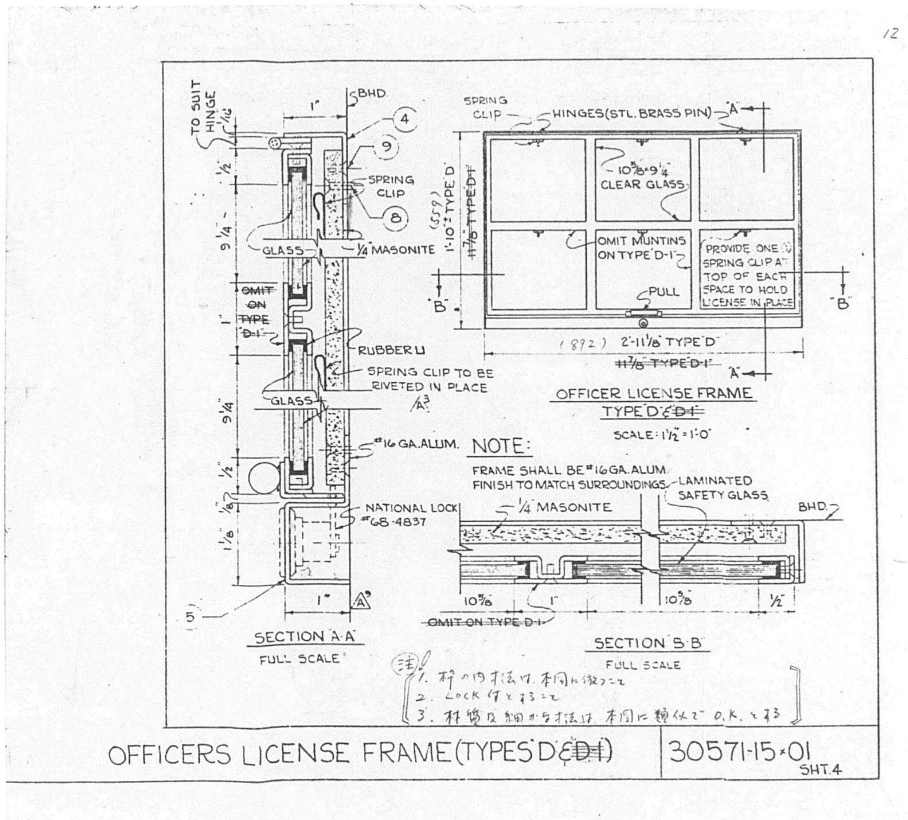


NOTICE FRAMES (TYPES "C" & "E")

30571-15×01
SHT. 5


12
TO SUIT HINGE
BHD.
SPRING CLIP
1/4 MASONITE
GLASS
OMIT ON TYPE D-1
RUBBER U
SPRING CLIP TO BE RIVETED IN PLACE
#16 GA. ALUM.
NATIONAL LOCK #68-4837
SECTION A-A
FULL SCALE
SPRING CLIP
HINGES (STL. BRASS PIN)
10 5/8 × 9 1/4 CLEAR GLASS
OMIT MUNTINS ON TYPE D-1
PROVIDE ONE SPRING CLIP AT TOP OF EACH SPACE TO HOLD LICENSE IN PLACE
PULL
(892) 2'-11 1/8 TYPE D
(559) 1'-10" TYPE D
OFFICER LICENSE FRAME
TYPE D
SCALE: 1 1/2" = 1'-0"
NOTE:
FRAME SHALL BE #16 GA. ALUM. FINISH TO MATCH SURROUNDINGS.
LAMINATED SAFETY GLASS
1/4 MASONITE
OMIT ON TYPE D-1
SECTION B-B
FULL SCALE
注
1. 枠の内寸法は本図に倣うこと
2. LOCK付とすること
3. 材質及細かな寸法は本図に類似でO.K.とする
OFFICERS LICENSE FRAME (TYPES D & D-1)
30571-15-01
SHT.4

1288

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	APRIL/8 1985	DISCUSSION MEMO						
A	JUNE/24 1985	OFTS/MES-607	JUNE/3 1985	H-00516			JULY/5 1985	—
B	AUG/8 1985	OFTS/MES-842						

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — MANAGER
SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION

厨室
GALLEY ETC. ARRANGEMENT

DATE (TEL 2236)
JOB NO. TS1323/24/25 — JOBCLASSIF.NO. D.11 — SCALE 1/50 — LYKES REF. NO. 340101 — MITSUI DRAWING NO. 4111601

(12 SHEETS WITH COVER)

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5. OCT. 1986	PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	

4111601

GENERAL NOTE

1. RULE AND REGULATION, "USCG AND USPH" SHALL BE APPLIED.

DWG.NO. 4111601

REFERENCE

NO.	REF. NO	DWG NO	DWG NAME
1	330102	4109110	ARRANGEMENT OF JOINER BULKHEAD, DECK COVERING & INSULATION
2	360601	4109103	RAT PROOFING
3	340201	4111605	GALLEY ETC. FURNITURE

DWG. NO. 4111601

1289

LIST OF EQUIPMENT (FOR GALLEY ETC.)

NO.	EQUIPMENT	CAPACITY	MAKER OR MODEL	STEAM OR ELECT. SOURCE	Q'TY	LOCATION	NOTE
01	MICROWAVE OVEN	1.3 KW	HOBART 1312-T	AC 240V 60HZ 1Ø	1	GALLEY	
02	MEAT SLICER	0.2 KW	HOBART 512	AC 115V 60HZ 1Ø	1		
03	BUTCHER BLOCK	460 x 610 x 25 THICK PLASTIC	PLASTI-TUFF	——	1		
04	DEEP FRYER	12 KW	HOBART MK-20	AC 480V 60HZ 3Ø	1		
05	ELECT. RANGE	20.4 KW	HOBART MR-40	AC 480V 60HZ 3Ø	1		
06	ELECT. GRIDDLE	22.2 KW	HOBART MR 42	AC 480V 60HZ 3Ø	1		
07	FOOD MIXER	0.25 KW	HOBART A 200-D	AC 115V 60HZ 1Ø	1		BENCH TYPE
08	LOWERATOR		AMF WYOTT	AC 120V 60HZ 1Ø	1		
09	DISH WASHER PRE-RINSE SPRAY	WITH WALL BRACKET	HOBART PR 3	——	1		
10	ELECT. REFRIGERATOR	600ℓ	GLENCO RSS-42-SE	AC 115V 60HZ 1Ø	1		ALL STAINLESS STEEL
11	DISH WASHER WITH BOOSTER HEATER	5 KW + 12 KW	HOBART AM14 HATCO C12	AC 460V 60HZ 3Ø	1		
12	HAND DRYER	——	115-VAC EXCEL NO.76-C	AC 115V 60HZ 1Ø	1		
13	HOT TABLE	7 KW	DUKE E-7-SR-SS	AC 480V 60HZ 1Ø	1		
15	COFFEE MAKER	1.7 KW	VACULATOR VAC-152	AC 115V 60HZ 1Ø	3	OFFR & PASS. DINING RM. CREW MESS RM. PASSENGER LOUNGE	
16	TOASTER (4-SLICE)	2.6 KW	HOBART ET 26	AC 115V 60HZ 1Ø	3	"	
17	ICE CUBE MAKER	70 Kg/DAY	SCOTSMAN AC25 MAS-1A	AC 115V 60HZ 1Ø	3	"	

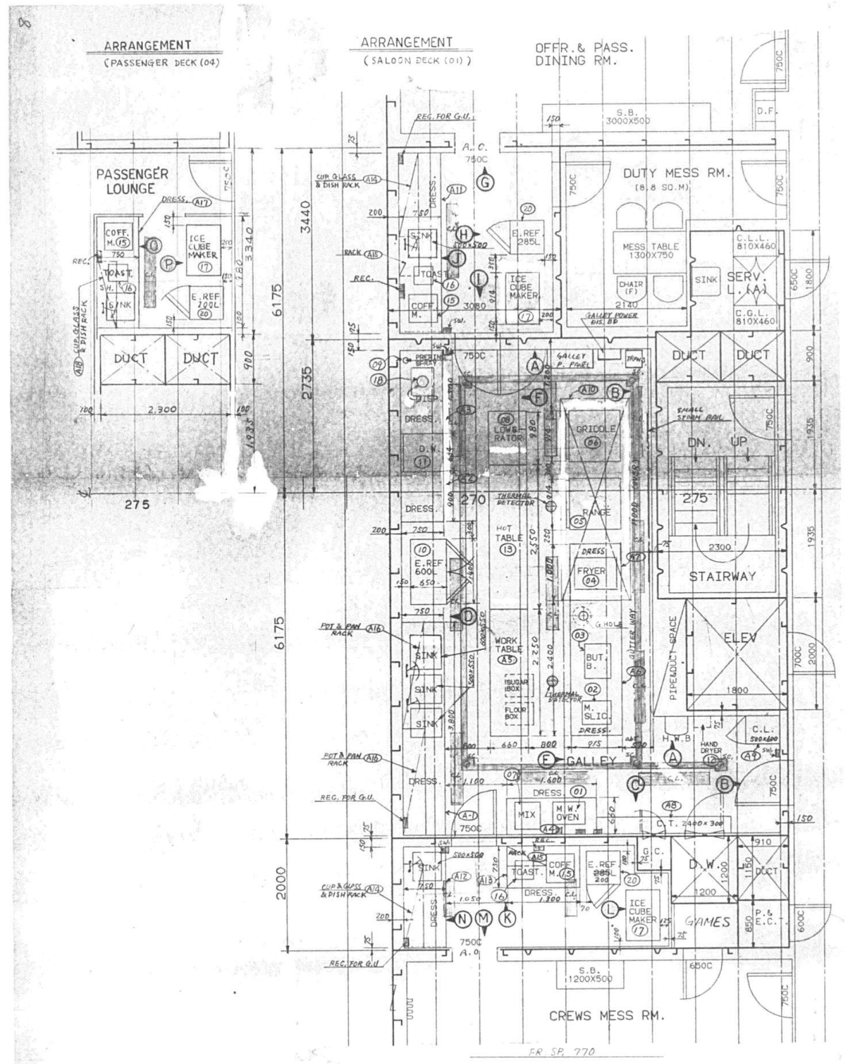
LIST OF FURNITURE (FOR GALLEY ETC.)

NO.	NAME	SIZE	MATERIAL BODY	MATERIAL LEG	Q'TY	LOCATION	NOTE
A 1	DRESSER	3800 × 750 × 910	STAINLESS STEEL	STAINLESS STEEL	1	GALLEY	
A 2	〃	900 × 〃 × 〃	〃	〃	1	〃	
A 3	〃	1500 × 〃 × 〃	〃	〃	1	〃	
A 4	〃	1600 × 660 × 〃	〃	〃	1	〃	
A 5	WORKING TABLE	2400 × 〃 × 〃	〃	〃	1	〃	
A 6	DRESSER	2400 × 915 × 〃	〃	〃	1	〃	
A 7	〃	1000 × 915 × 600	〃	〃	1	〃	
A 8	COUNTER TABLE	2400 × 300	〃	〃	1	〃	
A 9	CLEANING TOOL LOCKER	500 × 600 × 1900	〃	〃	1	〃	
A 10	HOOD	3600 × 1,250	〃	〃	1	〃	
A 11	DRESSER	3280 × 750 × 910	〃	〃	1	OFFR & PASS. DINING RM	
A 12	〃	1765 × 〃 × 〃	〃	〃	1	CREW MESS RM.	
A 13	〃	1300 × 〃 × 〃	〃	〃	1	〃	
A 14	CUP, GLASS & DISH RACK	1500 × 330 × 610	〃	〃	2	OFFR & PASS DINING RM, CREW MESS RM.	
A 15	RACK	760 × 250 × 200	〃	〃	2	〃 〃	
A 16	POT & PAN RACK	1900 × 410	〃	〃	2	GALLEY	
A 17	DRESSER	1,970 × 750 × 910	〃	〃	1	PASSENGER LOUNGE	
A 18	CUP. GLASS & DISH RACK	1200 × 330 × 610	〃	〃	1	〃 〃	

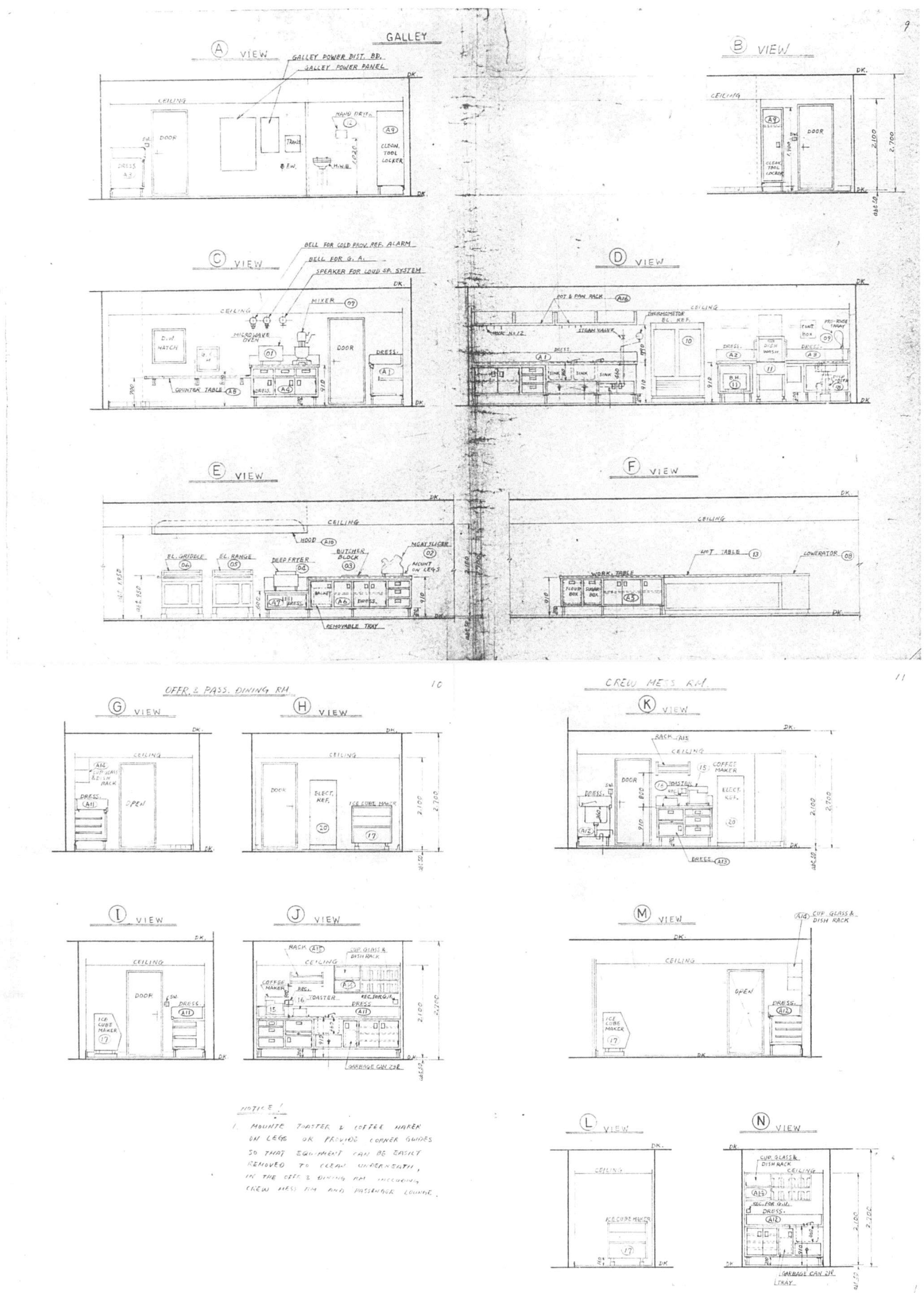
LIST OF EQUIPMENT (FOR GALLEY ETC.)

NO.	EQUIPMENT	CAPACITY	MAKER OF MODEL	STEAM OR ELECT. SOURCE	Q'TY	LOCATION	NOTE
18	DISPOSER	0.93 KW.	HOBART FD2-125	AC 460V 60HZ 3φ	1	GALLEY	
19	——	——	——	——	—	——	
20	ELECT. REFIGERATOR	200 ℓ	FOSTER MH-7-U	AC 115V 60HZ 1φ	3	OFFR & PASS. DINING RM, CREW MESS RM, PASSENGER LOUNGE	

1291


ARRANGEMENT
(PASSENGER DECK (04)
ARRANGEMENT
(SALOON DECK (01))
OFFR.& PASS.
DINING RM.
PASSENGER
LOUNGE
DUTY MESS RM.
GALLEY
STAIRWAY
ELEV
DUCT
CREWS MESS RM.
GAMES

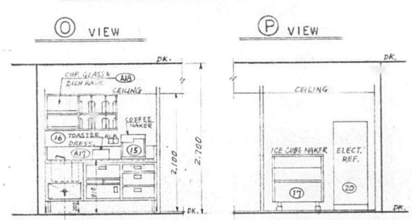
1292



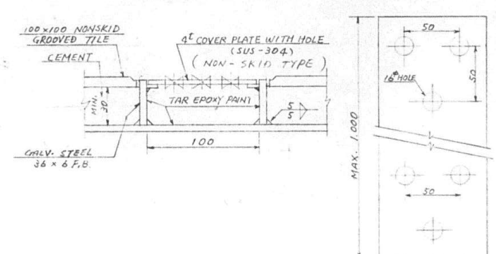
GALLEY
A VIEW
GALLEY POWER DIST. BD.
GALLEY POWER PANEL
CEILING
DOOR
CLEAN. TOOL LOCKER
B VIEW
C VIEW
BELL FOR COLD PROV. REF. ALARM
BELL FOR G. A.
SPEAKER FOR LOUD SP. SYSTEM
MIXER
MICROWAVE OVEN
D.W. HATCH
COUNTER TABLE
D VIEW
POT & PAN RACK
STEAM VALVE
THERMOMETER EL. REF.
E VIEW
HOOD
EL. GRIDDLE
EL. RANGE
DEEP FRYER
BUTCHER BLOCK
MEAT SLICER
MOUNT ON LEGS
REMOVABLE TRAY
F VIEW
WORK TABLE
HOT TABLE
GENERATOR
OFFR. & PASS. DINING RM.
G VIEW
OPEN
H VIEW
ELECT. REF.
ICE CUBE MAKER
CREW MESS RM.
K VIEW
COFFEE MAKER
I VIEW
ICE CUBE MAKER
J VIEW
CUP GLASS & DISH RACK
TOASTER
GARBAGE CAN 2H
M VIEW
L VIEW
N VIEW
NOTICE !
1. MOUNT TOASTER & COFFEE MAKER ON LEGS OR PROVIDE CORNER GUIDES SO THAT EQUIPMENT CAN BE EASILY REMOVED TO CLEAN UNDERNEATH, IN THE OFFR. & DINING RM. INCLUDING CREW MESS RM. AND PASSENGER LOUNGE.

1293

PASSENGER LOUNGE



GUTTER WAY IN GALLEY



1294

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	JULY/17 1985	OFFS/MES-762	JUNE/26 1985	M-00629			JULY/15 1985	—
A	SEP/16 1985	TOM/68						
A-1	OCT/17 1985	TAM/36		—				

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. **NO.1325** — SHIP'S NAME **TILLIE LYKES**

OUTFITTING DESIGN SECTION SEC. CHIEF

冷蔵庫装置

ARRG'T OF REF. PROV. STORE

(TEL 2236)

JOB NO. TS1323/24/25 — SCALE — LYKES REF. NO. 340301 — MITSUI DRAWING NO. 4113001

DECLASSIF. NO. D. 13.

(32 SHEETS WITH COVER)

2

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5. OCT. 1986	PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	[illegible]

3

GENERAL NOTE

1. THIS DRAWING SHOWS ARRANGEMENT OF REFRIGERATED PROVISION CHAMBER AND DETAIL OF REFRIGERATED PROVISION CHAMBER.
2. THE INSULATION MATERIALS SHALL BE AS FOLLOWS.
   a) GLASS WOOL ······ 20 kg/m³
   b) POLYURETANE FOAM ······ 30 kg/m³
3. FULLY DRYED GOOD QUALITY WOOD SHALL BE USED FOR THIS INSULATION WORKS.
4. THE WOODEN JOIST SHALL NOT BE IMPREGNATED WITH ANY PRESERVATIVE CHEMICALS.
5. ALL PLYWOOD SHALL BE OF TYPE-1 OF JAPANESE AGRICULTURAL STANDARD. (WATER-PROOF PLYWOOD)
6. ALL SURFACE OF WALLS AND CEILING SHALL BE 1.0 m/m ALUMINUM SHEET ON THE PLYWOOD.
7. ALL FLOORS SHALL BE COVERED WITH CEMENTS & TILES
8. THE INSULATION DOOR IN EACH STORE SHALL BE OF STAINLESS STEEL SHEET SURFACE.
9. ALL SHELVES SHALL BE MADE OF STAINLESS STEEL, AND TO BE REMOVABLE FOR CLEANING.
10. ALL VISIBLE SCREW SHALL BE OF LOW-PROFILE SLOT (-) HEAD SCREW, AND TO BE OF STAINLESS STEEL.
11. REF. PROVISION STORE SHALL BE CONSTRUCTED IN ACCORDANCE WITH U.S.CG. AND U.S.P.H RULES.

DWG. NO.

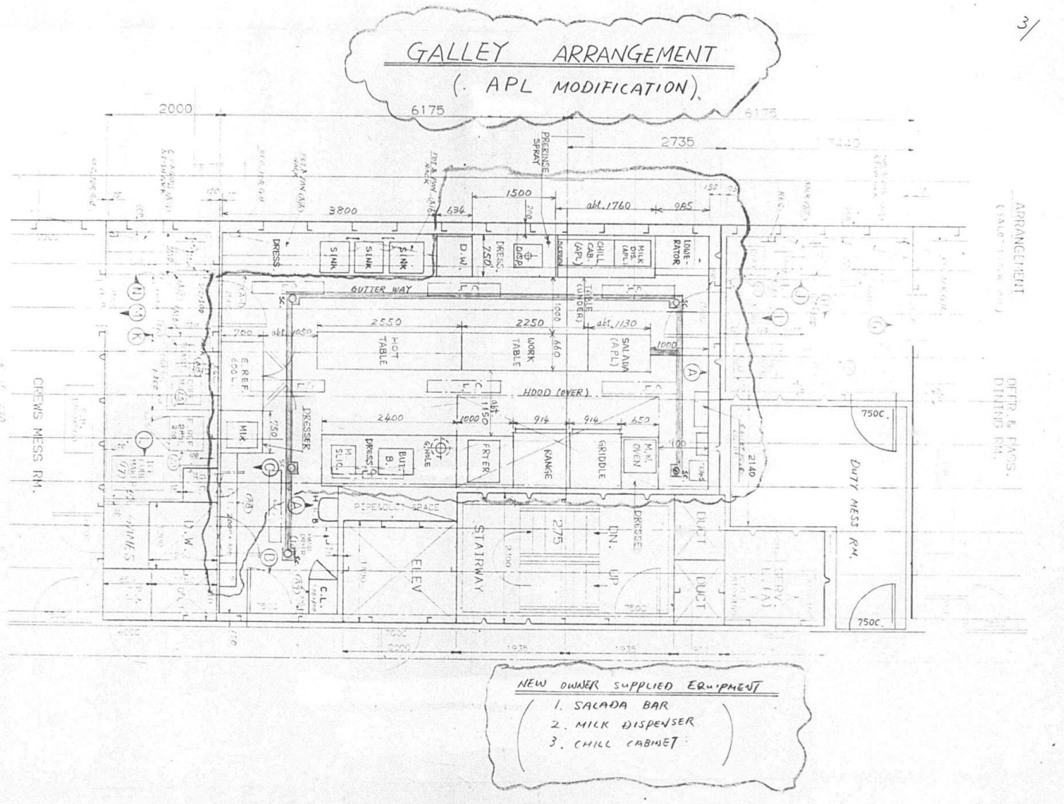
4

REFERENCE

NO.	REF. NO	DWG NO	DWG NAME
1	340303	4113201	PROVISION REF. PLANT

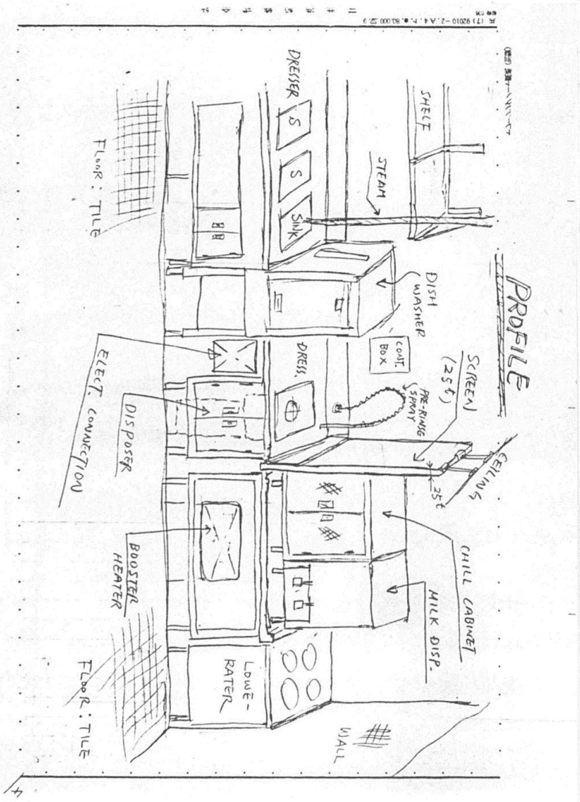
1295

3/



NEW OWNER SUPPLIED EQUIPMENT
1. SALADA BAR
2. MILK DISPENSER
3. CHILL CABINET

2/



SE-RYKOFF AND CO
--- DEC-23-'86 15:38 ID:SE-RYKOFF AND CO TEL NO:415 337-0999 #005 P04

5/

SALAD BAR

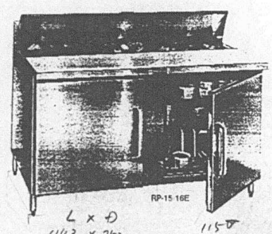
Star Frost Series E

Extra Value <SALAD BAR> Standard Features

- Greater flexibility, more than any other manufacturer... wider choice of models . . . two different lengths, 45" long and 59" long. Six different standard pan arrangements—four different size toaster or appliance sections complete with stainless steel back splash, electrical receptacle cutout and chrome plated cover plate.
- Gleaming life time sanitary stainless steel tops, fronts, doors and exterior ends.
- Energy saving high humidity forced air refrigeration system with automatic defrost, for colder salad or condiment pans, maximum performance and faster recovery with less product dehydration and greatly reduced run time.
- New full access combination stainless steel telescoping box cover and utility shelf for increased versatility.
- Exclusive "One-shot," high pressure foamed-in-place, polyurethane insulation throughout cabinet (average 2" thick) . . . provides maximum energy savings.
- Unique forced air cooled compressor ventilation system allows equipment to be installed against rear or adjacent walls—zinc coated steel enclosed rear.
- Full 4" deep condiment or salad pans as standard, holds up to 70% more product. Will accept 6" deep pans.*
- Adjustable stainless steel legs, 6" high.
- Satin finish, coved, sanitary .040 aluminum interior as standard, also available with optional stainless steel interior.
- Self-closing doors with self-adjusting magnetic gaskets for a positive stay tight seal.
- Non-conductive high impact thermal breakers around doors, sanitary raised spill edge and thermal breaker around top pan opening to retard temperature transfer and condensation.
- Extra wide 12", full length removable reversible sanitary synthetic cutting board.
- Energy free automatic condensate evaporator eliminates the need for plumbing and floor drains.
- All models completely self-contained with automatic thermostat—plug in operation.
- Plasticized evaporator fin coils for extra long life.
- Adjustable, removable chrome plated rod shelves for extra flexibility and product storage.
- One piece chrome plated heavy duty door pulls, concealed hinge mechanism.
- Interior thermometer.

*Hi-impact polycarbonate, superior for cold food storage, dishwasher safe.

NSF UL



RP-15 16E

L x D
1143 x 752

115 V
60 Hz 1φ

TWO DOOR SANDWICH UNITS (45" and 59" MODELS)

Model	Capacity (Cu. Ft. Cu. m.)	Length	Depth	[illegible]	Shelf Area (Sq. Ft. Sq. m.)	Top
RP-10-6E Doors	12 (.339 cu. m.)	45" (114.3 cm.)	29¾" [illegible]	[illegible]	12.74 (1.18 sq. m	6 [illegible] Size Pans 2[illegible] Toaster Section (55 cm.)
RP-10-8E Doors	12 (.339 cu. m.)	45" (114.3 cm.)	29¾" [illegible]	[illegible]	12.74 (1.18 sq. m	6 [illegible] Size Pans 2 [illegible] Size Pans [illegible] Toaster Section (29 cm.)
RP-10-12E Doors	12 (.339 cu. m.)	45" (114.3 cm.)	[illegible]	[illegible]	12.74 (1.18 sq. m	[illegible] Size Pans
RP-15-8E Doors	16 (.453 cu. m.)	59" (150 cm.)	[illegible]	[illegible]	17.2 (1.6 sq. m	[illegible] Size Pans [illegible] Size Pans [illegible] Toaster Section (66 cm.)
RP-15-12E Doors	16 (.453 cu. m.)	59" (150 cm.)	[illegible]	[illegible]	47.2 (1.6 sq. m	[illegible] Size Pans [illegible] Toaster Section (36 cm.)
RP-15-16E Doors	16 (.453 cu. m.)	59" (150 cm.)	[illegible]	[illegible]	17.2 (1.6 sq. m	[illegible] Size Pans

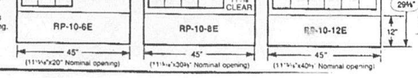
Condensing unit—45" long models, ⅓ hp, 5.9 max. amps
59" long models, ¼ hp, 6.1 max. amps
115 volt, 60 Hertz, 1 phase, 6'-0" (1.85 m.) (3) wire power cord and plug (NEMA 5-15)

Double door models are hinged as illustrated, no other hinging is available.

Pan layout

Pan opening sizes as noted for each model will accommodate any combination or arrangement of up to 6" deep full or fractional pans suitable for that size opening.

See chart for size and number of pans supplied as standard.

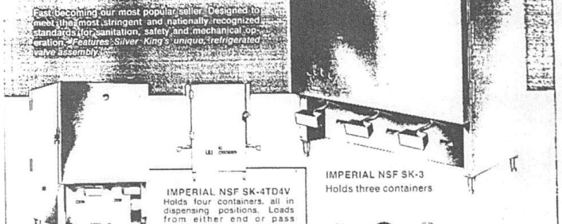


1296

Silver King

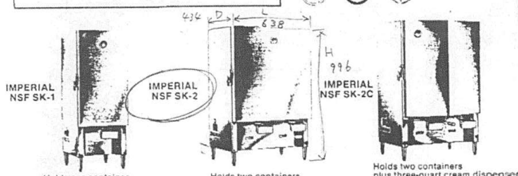
IMPERIAL NSF MODELS
Refrigerated Milk Dispensers

Fast becoming our most popular seller. Designed to meet the most stringent and nationally recognized standards for sanitation, safety and mechanical operation. Features Silver King's unique, refrigerated valve assembly.



IMPERIAL NSF SK-4TD4V
Holds four containers, all in dispensing positions. Loads from either end or pass through. Allows service from both sides at once.

IMPERIAL NSF SK-3
Holds three containers



IMPERIAL NSF SK-1
Holds one container

IMPERIAL NSF SK-2
Holds two containers

IMPERIAL NSF SK-2C
Holds two containers plus three-quart cream dispenser with separate valve

IMPERIAL NSF MODEL FEATURES

CABINET: Stainless steel interior, 18-gauge bottom. Stainless steel exterior. 12-gauge steel angle frame welded into cabinet interior. 12-gauge steel welded base assembly. Anti-fungus treated hardwood supports.

DOORS: Stainless steel interiors and exteriors. Temperature indicator in doors.

REFRIGERATION: Copper tube cold wall evaporator. Hermetically sealed system. Adjustable temperature control.

HARDWARE: Glass locators on front aprons. Chrome plated or stainless steel, wide surface, 3-hole hinges. NSF approved, adjustable metal legs.

GASKETS AND BREAKER STRIPS: Thermal-plastic PVC, non-migrating, sealed in place.

APPROVALS: MIL-STD-175; Federal Specification CO-D-450B; National Sanitation Foundation; New York City and State; U.S. Dept. of Public Health; Underwriters Laboratories; Canadian Standards Association.

VALVES: Exclusive refrigerated system. (See back side).

CONTAINERS: Accommodates 3 or 5-gallon dispenser cans or 3, 5 or 6-gallon single service bag and box containers.

INSULATION: Semi-rigid fiberglass and rigid poly-foam.

DESIGN, SK4TD4V: Front or rear loading. Front or rear dispensing, both at same time. Pass through container handling and cleaning.

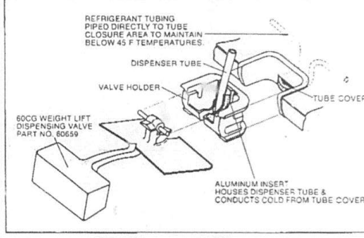
FINISHES: SK-1 and SK-2 are also available with presidential walnut woodgrain exterior at additional cost.

IMPERIAL NSF MODEL SPECIFICATIONS

IMPERIAL NSF SK-1	One	One or Two	39¼" to 40¼"	14⅛"	17⅛"	118 Lbs.	115V	2.0	14.6	• Freon 12 • Static Condenser • Balanced System to Maintain 35°F Product Temp.	Heavy Wall .032 x ⅜" O.D. Refrigeration Type "C" Copper Tubing
							220V	1.0	6.8		
IMPERIAL NSF SK-2	Two	One Two or Three	39¼" to 40¼"	25⅛"	17⅛"	137 Lbs.	115V	2.0	14.6		
							220V	1.0	6.8		
IMPERIAL NSF SK-2C	Two Milk and 3-Qt. Creamer Capacity	One or Two	39¼" to 40¼"	25⅛"	19⅜"	153 Lbs.	115V	2.0	14.6		
							220V	1.0	6.8		
IMPERIAL NSF SK-3	Three	One Two or Three	39¼" to 40¼"	36⅛"	17⅛"	183 Lbs.	115V	3.0	22.0		
							220V	1.6	10.7		
IMPERIAL NSF SK4TD4V	Four All in Dispensing Positions		42⅛" to 43⅛"	25⅛"	27¼"	230 Lbs.	115V	3.2	22.0	• Freon 12 • Forced Air Condenser • Balanced System to Maintain 35°F Product Temperature	
							220V	Step Down Transformer			

*Optional accessories at additional cost

Specifications subject to change without notice



SILVER KING EXCLUSIVE REFRIGERATED VALVE SYSTEM

National Sanitation Foundation (Standard No. 20) requires that milk be maintained at a temperature of 45°F or lower at the pinch point of the dispensing valve as well as in the milk storage compartment.

To meet that Standard, Silver King Imperial NSF Models incorporate an exclusive refrigerated valve system which insures constant and positive refrigeration of milk (below 45°F) at the pinch point.

This is accomplished by piping the refrigerant tubing directly into the valve holder at the point where a cold conducting, aluminum insert houses the dispenser tube.

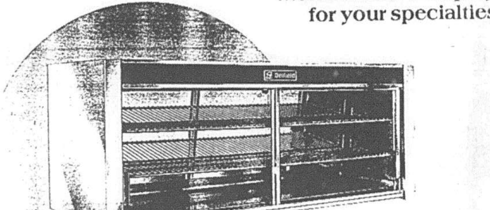
Silver King DIVISION OF STEVENS LEE COMPANY
1600 Xenium Lane North • Minneapolis Industrial Park, MN 55441 • Area Code: 612/553-1881

IMP75 PRINTED IN USA

1ST CHOICE IN VALUE Delfield

NEW 9000 Series Display Cases

...an attractive display for your specialties



The Delfield Difference is apparent at first glance and obvious over years of service when you install these versatile display cases. Fashioned of gleaming stainless steel and your choice of optional designer-pattern laminates, they are available in four refrigerated models to fit your layout and service requirements.

featuring the exclusive DELRITE™ interior

Exclusive DELRITE interiors are engineered for long life and easy cleaning. Foamed-in-place insulation gives thermal efficiency without bulky wall thickness. Self-closing, insulated thermopane glass sliding doors allow your people to use both hands for their work.

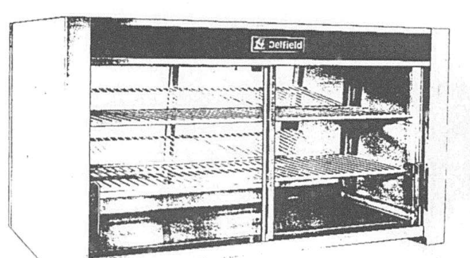
All models feature a quietly efficient cooling unit, mounted inside the rear of the case. Just 20-1 8" high and 22" deep, these self-contained units are easily wall or counter mounted just where you need them.

1ST CHOICE IN VALUE Delfield

PROJECT ______
ITEM NO. ______
DATE ______

9000 SERIES DISPLAY CASES

22¼" DEEP ONLY



Self-Contained Display Case 9000

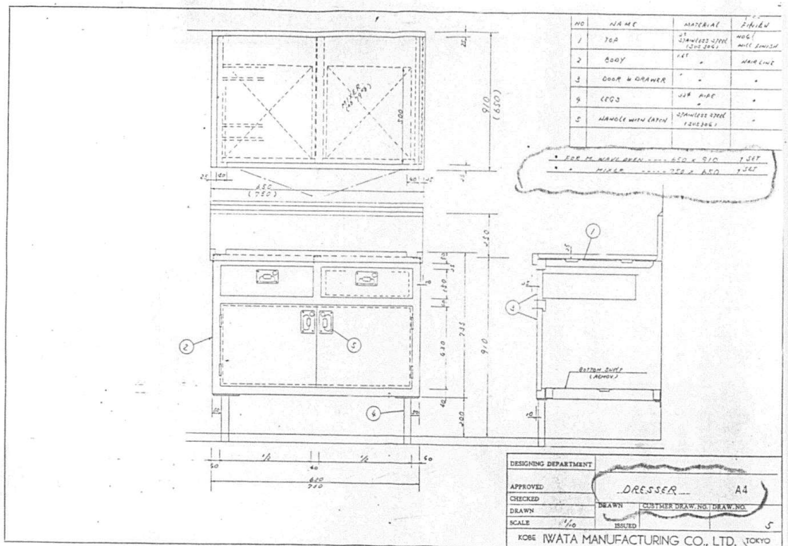
Self-contained refrigerated display case. Exterior sides to be constructed of 20-gauge stainless steel. Exterior top, back and bottom to be constructed of 20-gauge galvanized metal. Cabinet front to be trimmed with 20-gauge stainless steel and plastic laminate. Front to be enclosed with 1/2-in. thick thermopane glass doors. Doors to be self closing on top-mounted roller tracks.

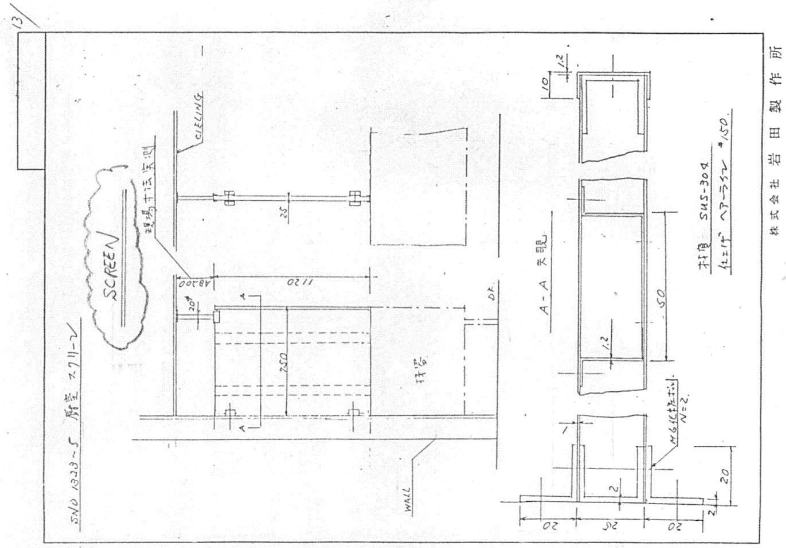
Cabinet interior sides to be constructed of ABS material. Interior top, back and bottom to be constructed of 20-gauge stainless steel. 1/4-in. thick plate glass mirror to be mounted in back, in front of evaporator coil and blower fan. Unit to be completely insulated with a minimum of 2 in. high-density foamed-in-place polyurethane.

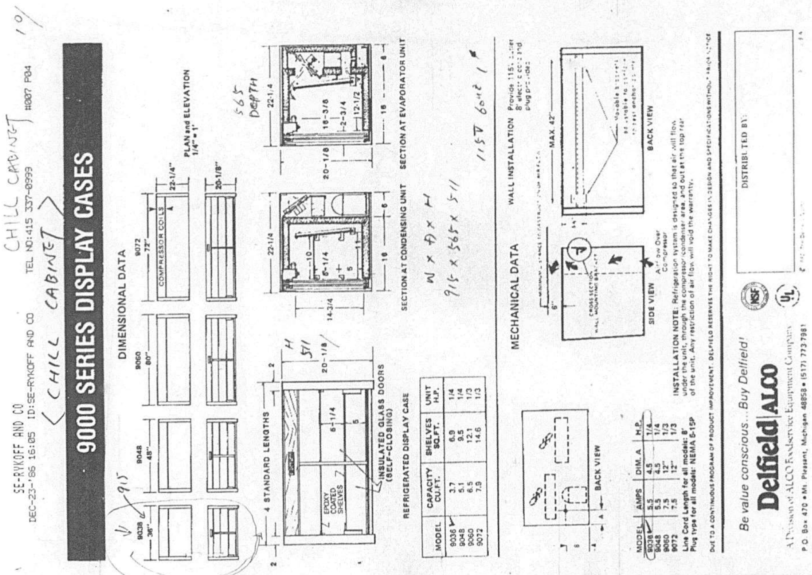
Unit to be supplied with (2) adjustable epoxy-coated wire shelves and (1) fluorescent light with on/off switch. 1 4 h.p. compressor to be mounted on cabinet rear with condenser coil and hot gas evaporator. Refrigerant flow to be controlled by capillary tube.

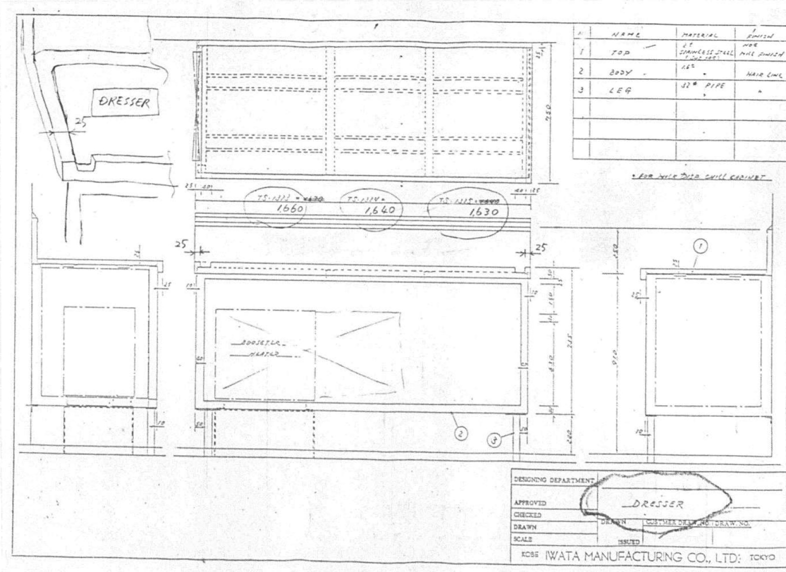
Unit to be supplied with wall mounting angle with (2) brackets shipped loose for field installation. Unit to be completely wired with cord and plug.

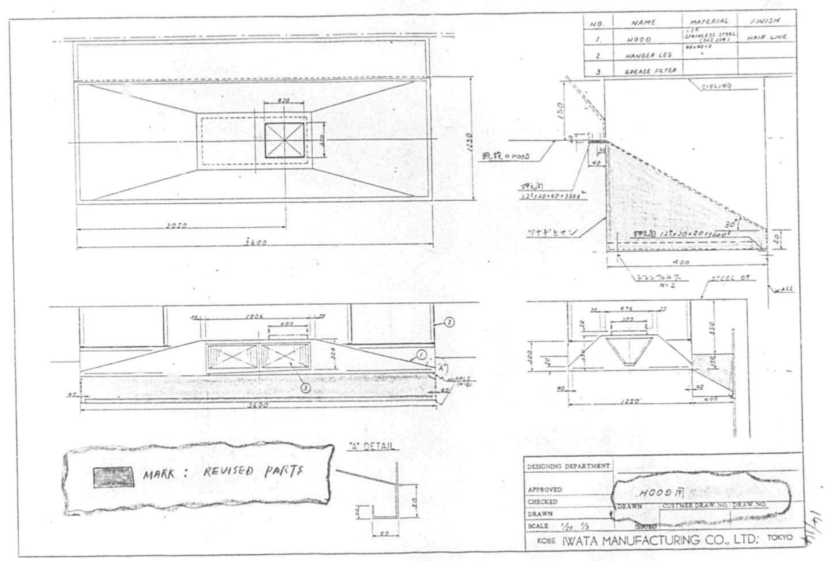
1297


DRESSER
A4
DESIGNING DEPARTMENT
APPROVED
CHECKED
DRAWN
SCALE
KOBE IWATA MANUFACTURING CO., LTD. TOKYO


CEILING
SCREEN
WALL
A-A 矢視
SUS-304
株式会社 岩田製作所


9000 SERIES DISPLAY CASES
CHILL CABINET
DIMENSIONAL DATA
MECHANICAL DATA
REFRIGERATED DISPLAY CASE
SECTION AT CONDENSING UNIT
SECTION AT EVAPORATOR UNIT
WALL INSTALLATION
SIDE VIEW
BACK VIEW
Be value conscious... Buy Delfield!
Delfield | ALCO


DRESSER
DESIGNING DEPARTMENT
APPROVED
CHECKED
DRAWN
SCALE
KOBE IWATA MANUFACTURING CO., LTD. TOKYO


NO.
NAME
MATERIAL
FINISH
1. HOOD
1.2t STAINLESS STEEL (SUS 304)
HAIR LINE
2. HANGER LEG
60×40×3
3. GREASE FILTER
CIELING
150
1250
400
2600
3600
1250
2000
MARK : REVISED PARTS
"A" DETAIL
DESIGNING DEPARTMENT
APPROVED
CHECKED
DRAWN
SCALE 1/20, 1/3
HOOD 図
DRAWN
CUSTMER DRAW. NO.
DRAW. NO.
ISSUED
KOBE IWATA MANUFACTURING CO., LTD. TOKYO

1299

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	JULY/17 1985	OPFS/MES-762	JUNE/26 1985	M-00629			JULY/5 1985	—
A	SEP/16 1985	TAM/68						
A-1	OCT/17 1985	TAM/86						

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION

冷蔵庫装置

ARRG'T OF REF. PROV. STORE

(TEL 2236)

JOB NO. S1323/24/25 — SCALE — LYKES REF. NO. 340301 — MITSUI DRAWING NO. 4113001

JOBCLASSIF. NO. D. 13.

(32 SHEETS WITH COVER)

2

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5.OCT. 1986	PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325.	T.Suke T.Suke

3

GENERAL NOTE

1	THIS DRAWING SHOWS ARRANGEMENT OF REFRIGERATED PROVISION CHAMBER AND DETAIL OF REFRIGERATED PROVISION CHAMBER.
2	THE INSULATION MATERIALS SHALL BE AS FOLLOWS. a) GLASS WOOL ...... 20 kg/m³ b) POLYURETANE FOAM ...... 30 kg/m³
3	FULLY DRYED GOOD QUALITY WOOD SHALL BE USED FOR THIS INSULATION WORKS.
4	THE WOODEN JOIST SHALL NOT BE IMPREGNATED WITH ANY PRESERVATIVE CHEMICALS.
5	ALL PLYWOOD SHALL BE OF TYPE-1 OF JAPANESE AGRICULTURAL STANDARD. (WATER-PROOF PLYWOOD)
6	ALL SURFACE OF WALLS AND CEILING SHALL BE 1.0 m/m ALUMINUM SHEET ON THE PLYWOOD.
7	ALL FLOORS SHALL BE COVERED WITH CEMENTS & TILES
8	THE INSULATION DOOR IN EACH STORE SHALL BE OF STAINLESS STEEL SHEET SURFACE.
9	ALL SHELVES SHALL BE MADE OF STAINLESS STEEL, AND TO BE REMOVABLE FOR CLEANING.
10	ALL VISIBLE SCREW SHALL BE OF LOW-PROFILE SLOT (-) HEAD SCREW, AND TO BE OF STAINLESS STEEL
11	REF. PROVISION STORE SHALL BE CONSTRUCTED IN ACCORDANCE WITH U.S.C.G. AND U.S.P.H RULES.

DWG.NO.

4

REFERENCE

NO.	REF. NO	DWG NO	DWG NAME
1	340303	4113201	PROVISION REF. PLANT

1300

(5)

ROOMS	AIR VOLUME	TEMPE-RATURE	COOLING METHOD	REMARK
VOLUME & PRESERVED TEMPERATURE				
MEAT ROOM				
FISH ROOM				
VEGETABLE ROOM				
LOBBY				
FROZEN	abt. 32 m³	−18°C	COLD DIFF.	
CHILLED	abt. 38 m³	+2°C	COLD DIFF.	

THICKNESS OF INSULATION, LINING (mm)

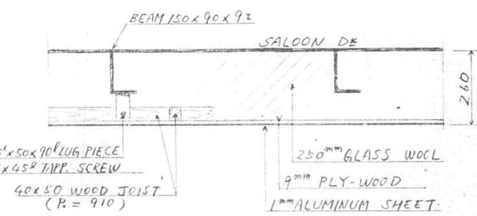
ITEM		INSULATION MATERIALS: GLASS WOOL	INSULATION MATERIALS: POLYURETHANE -FOAM	LINING SURFACE: PLY-WOOD	LINING SURFACE: ALUMINUM SHEET	FLOOR COVERED: LEAD PLATE	FLOOR COVERED: CEMENT	FLOOR COVERED: TILE	TOTAL
CEILING		250		9	1				260 (259)
SIDE WALL	EXPOSED PART	250		55+12	1				269
SIDE WALL	NON EXPOSED PART	250		12	1				263
SIDE WALL	〃								
DIV. WALL		150		12+12	1+1				176
FLOOR			125	18		1.5	50	8	203

NOTE: GLASS WOOL ---- 20Kg/m³
POLYURETHANE FOAM ---- 30Kg/m³
WOODEN JOIST SHALL NOT BE IMPREGNATED WITH ANY PRESERVATIVE CHEMICALS.
ALL PLY-WOOD SHALL BE TYPE-1 OF JAPANESE AGRICULTURAL STANDARD (WATER-PROOF PLY-WOOD).

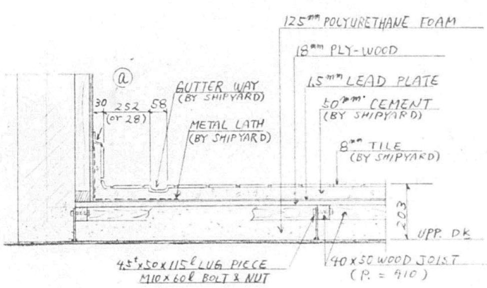
INOUE REINETSU CO.,LTD.

(6)

CEILING



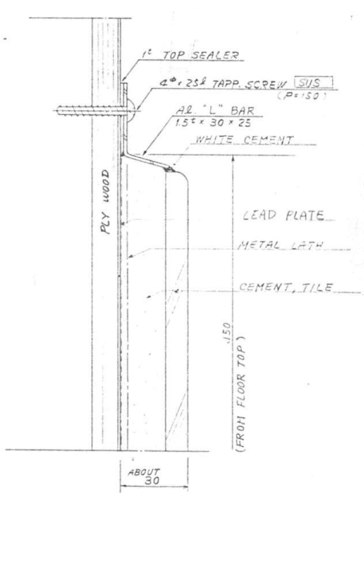
FLOOR



INOUE REINETSU CO.,LTD.

(7)

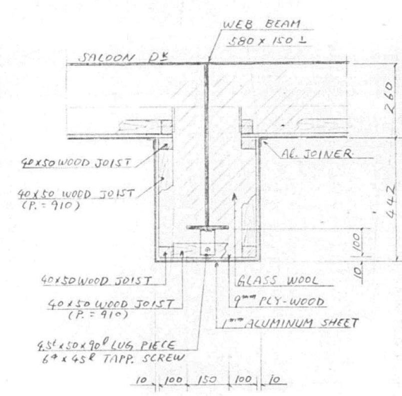
ⓐ DETAIL



INOUE REINETSU CO.,LTD.

(8)

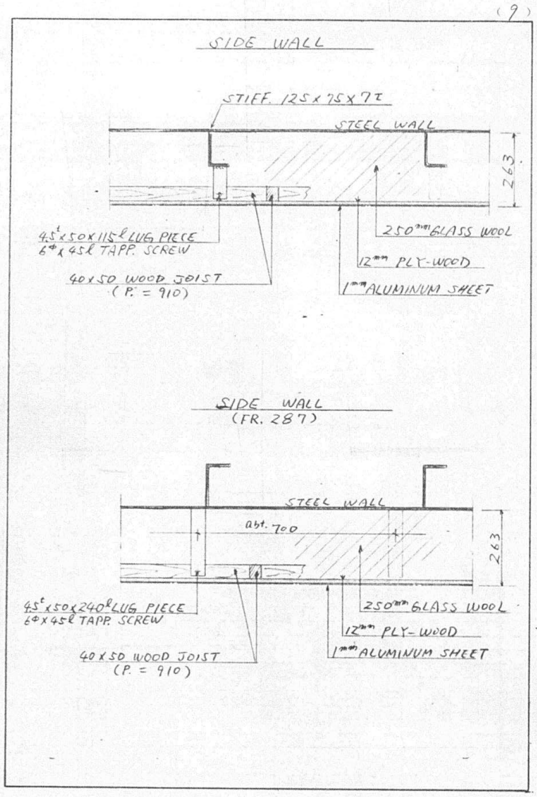
WEB BEAM COVER



INOUE REINETSU CO.,LTD.

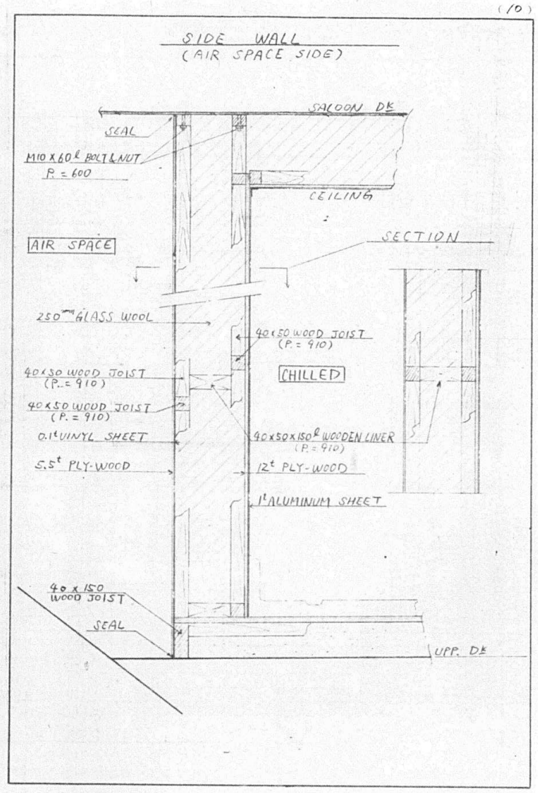
1301

(9)



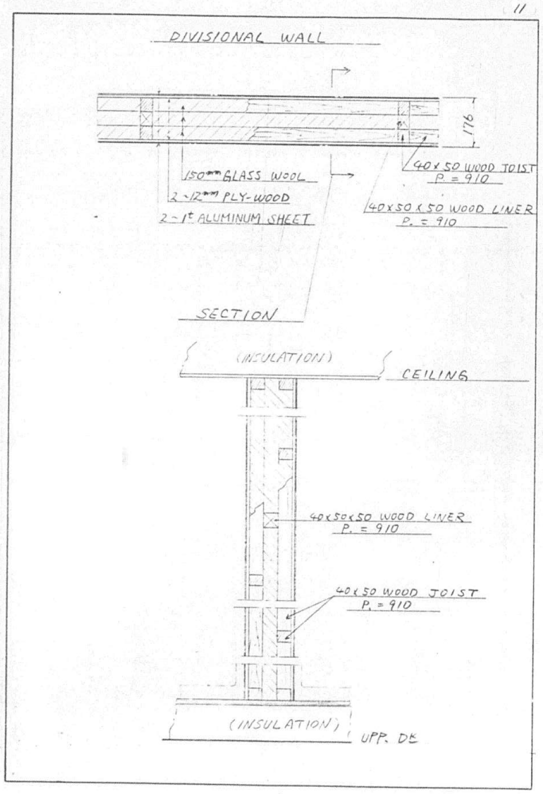
INOUE REINETSU CO.,LTD.

(10)



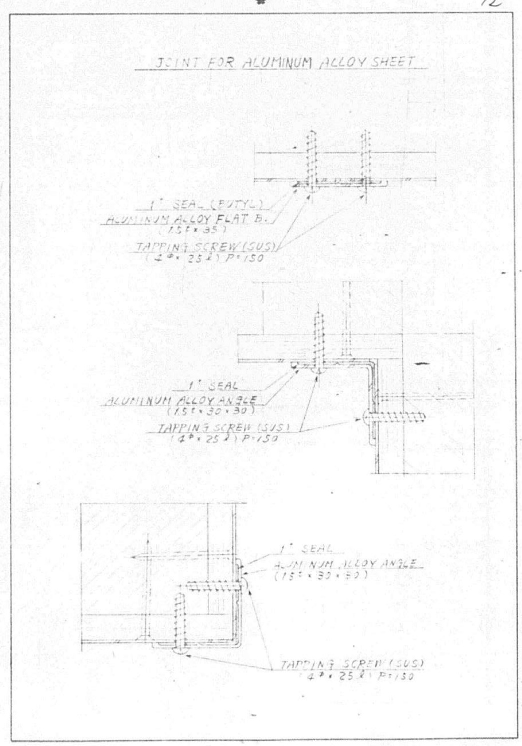
INOUE REINETSU CO.,LTD.

11



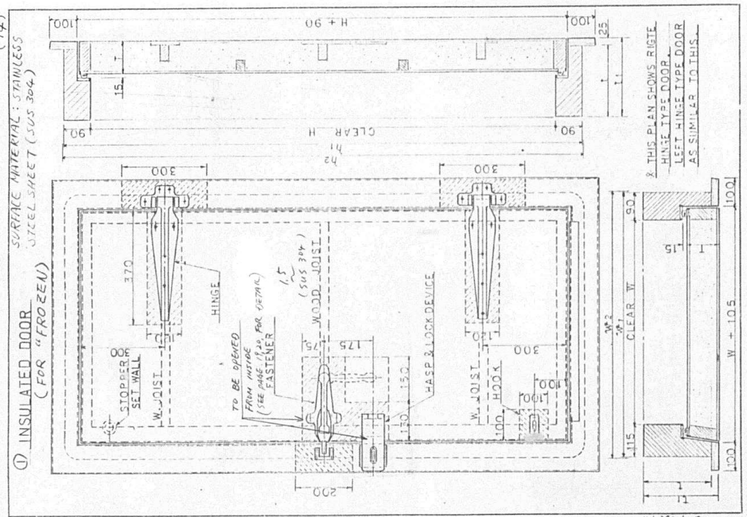
INOUE REINETSU CO.,LTD.

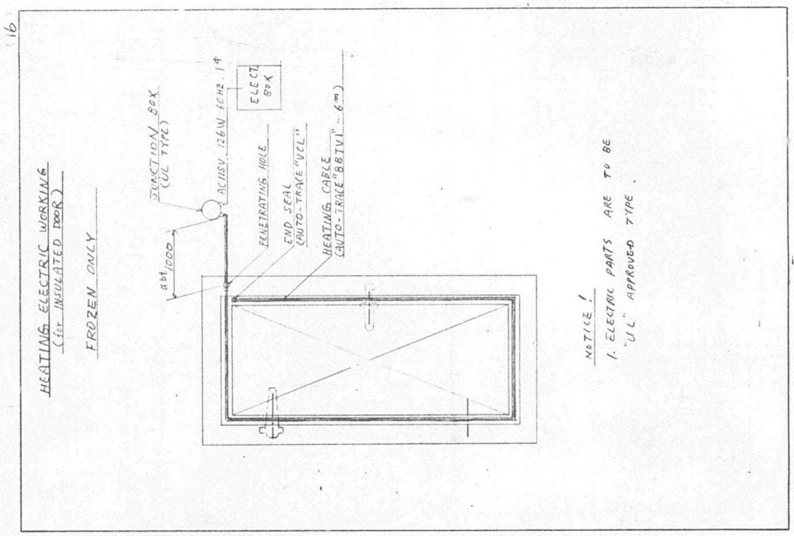
12



INOUE REINETSU CO.,LTD.

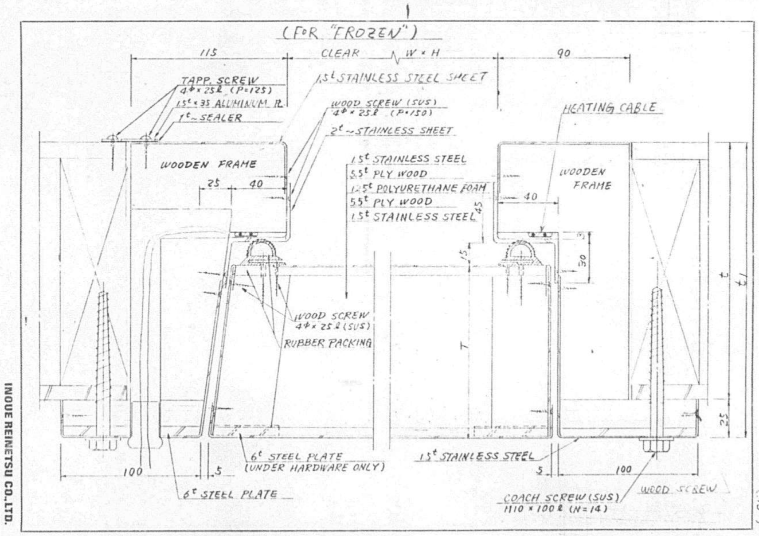
1302

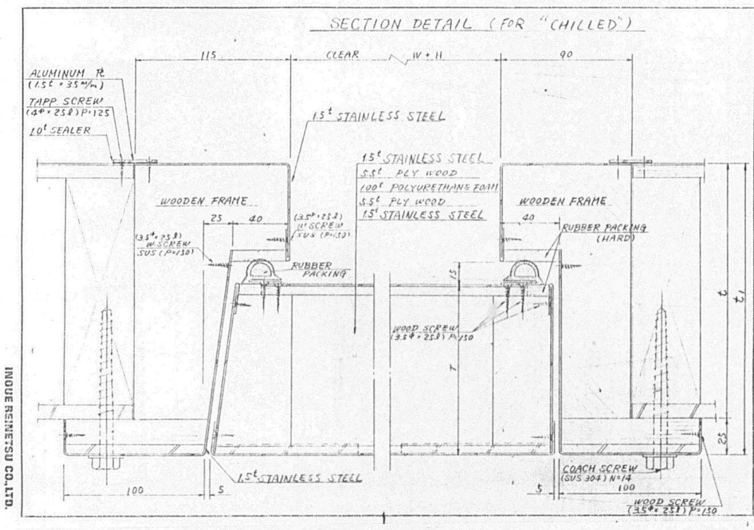


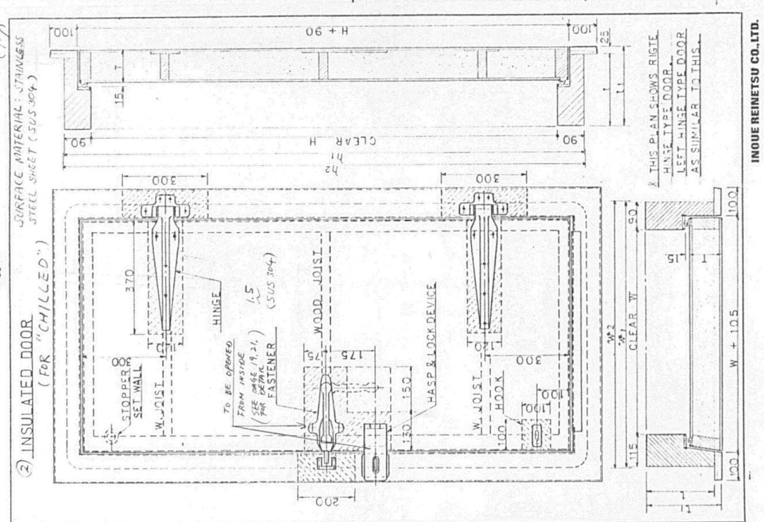


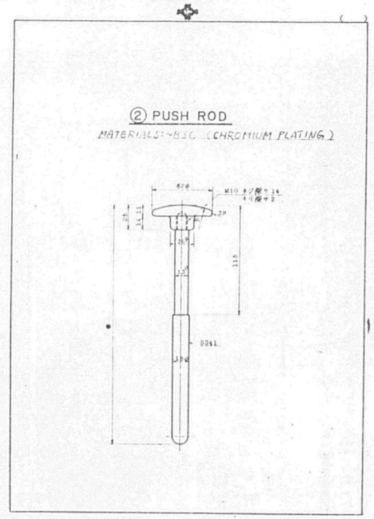
DOOR LIST & SIZE

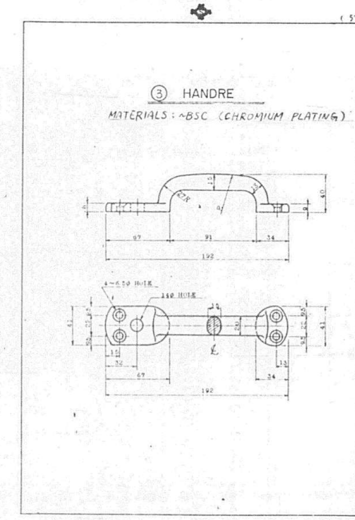
MARK	DOOR CLEAR & THICKNESS					DOOR FRAME				STEEL CUT		OPEN		ROOM
	W	H	T	~~T_1~~	~~T_2~~	w_1	h_1	t	t_1	w_2	h_2	LEFT	RIGHT	
①	700	1700	139			905	1880	270	295	915	1890		1[SET]	FROZEN
②	700	1700	114			905	1880	270	295	915	1890		1[SET]	CHILLED
○														
○														
○														

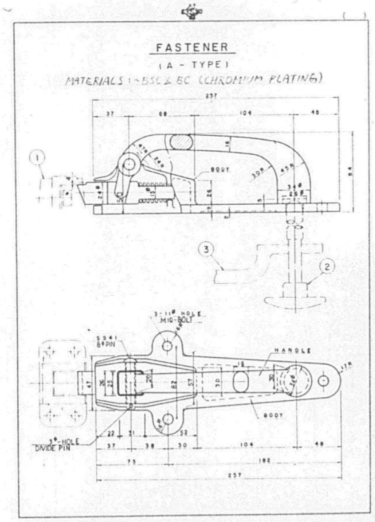


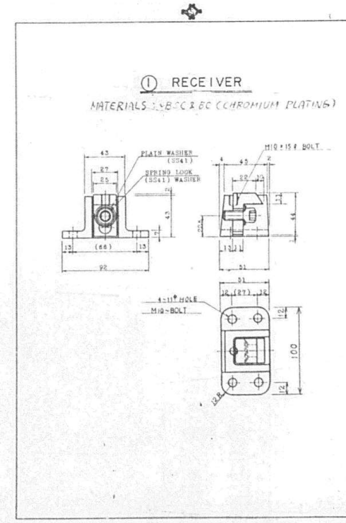

SECTION DETAIL (FOR "CHILLED")
ALUMINUM
TAPP SCREW
1.0t SEALER
1.5t STAINLESS STEEL
5.5t PLY WOOD
100t POLYURETHANE FOAM
WOODEN FRAME
RUBBER PACKING
RUBBER PACKING (HARD)
WOOD SCREW
COACH SCREW
INOUE REINETSU CO.,LTD.


② INSULATED DOOR (FOR "CHILLED")
SURFACE MATERIAL: STAINLESS STEEL SHEET (SUS 304)
THIS PLAN SHOWS RIGTE HINGE TYPE DOOR. LEFT HINGE TYPE DOOR AS SIMILAR TO THIS.
HINGE
WOOD JOIST
W. JOIST
HASP & LOCK DEVICE
STOPPER SET WALL
HOOK
CLEAR H
CLEAR W
H + 90
W + 105
INOUE REINETSU CO.,LTD.

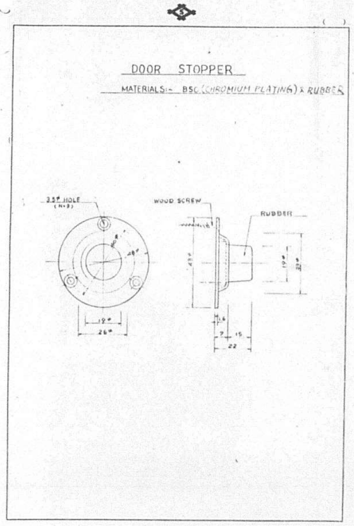

② PUSH ROD
MATERIALS: BSC (CHROMIUM PLATING)

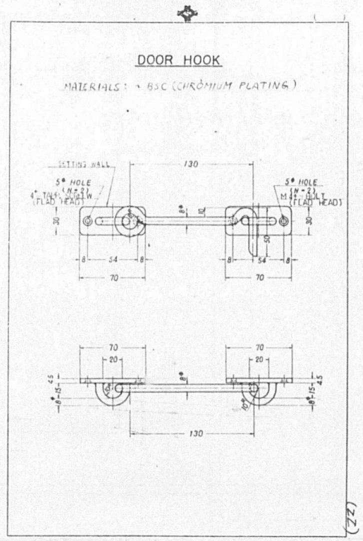

③ HANDRE
MATERIALS: BSC (CHROMIUM PLATING)

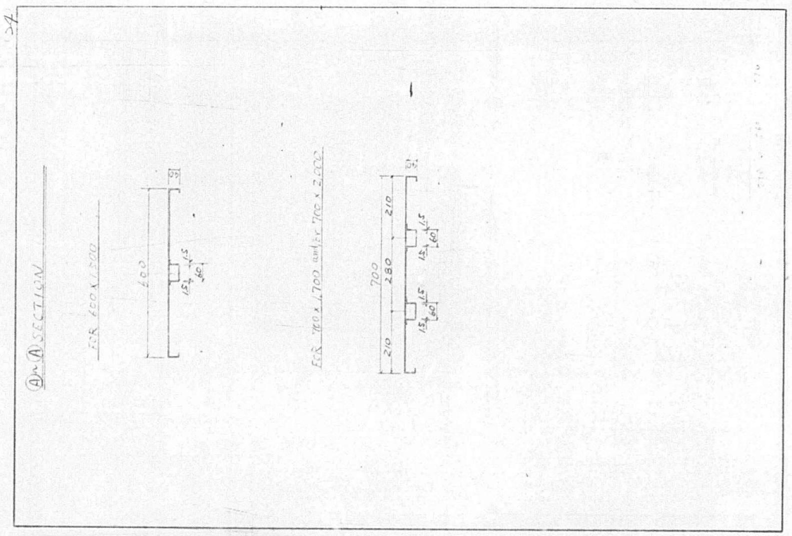

FASTENER
(A - TYPE)
MATERIALS: BSC & BC (CHROMIUM PLATING)
HANDLE
BODY

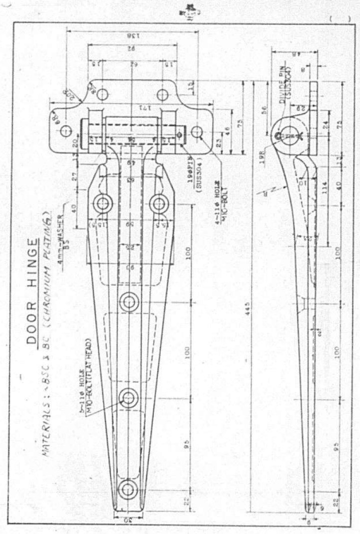

① RECEIVER
MATERIALS: BSC & BC (CHROMIUM PLATING)
PLAIN WASHER
SPRING LOCK WASHER
M10 × 15 ℓ BOLT
M10-BOLT

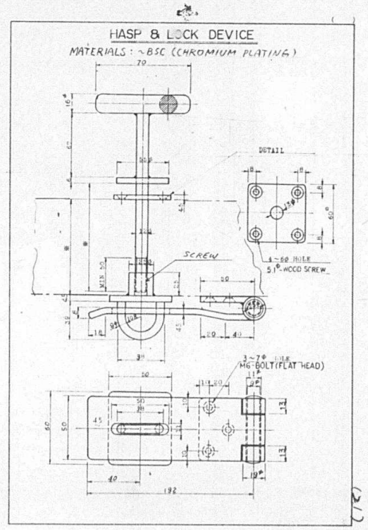
1304

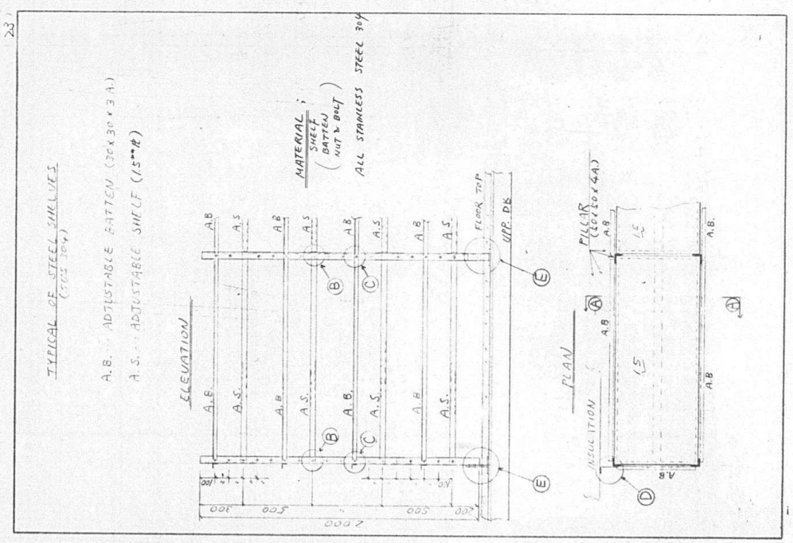

DOOR STOPPER
MATERIALS:- BSC (CHROMIUM PLATING) x RUBBER
WOOD SCREW
RUBBER
INOUE REINETSU CO.,LTD.


DOOR HOOK
MATERIALS: - BSC (CHROMIUM PLATING)
130
70
130
(22)

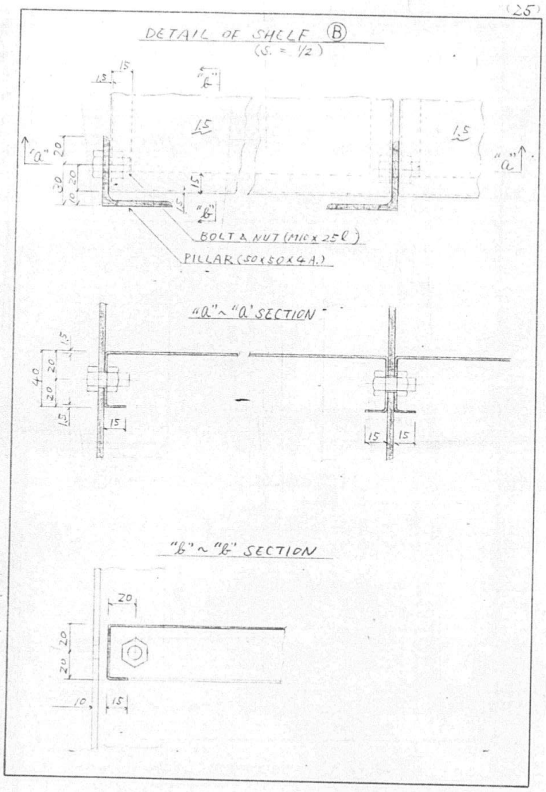

A - A SECTION
FOR 600 x 1,700
FOR 700 x 1,700 and 700 x 2,000
INOUE REINETSU CO.,LTD.


DOOR HINGE
MATERIALS: - BSC & BC (CHROMIUM PLATING)

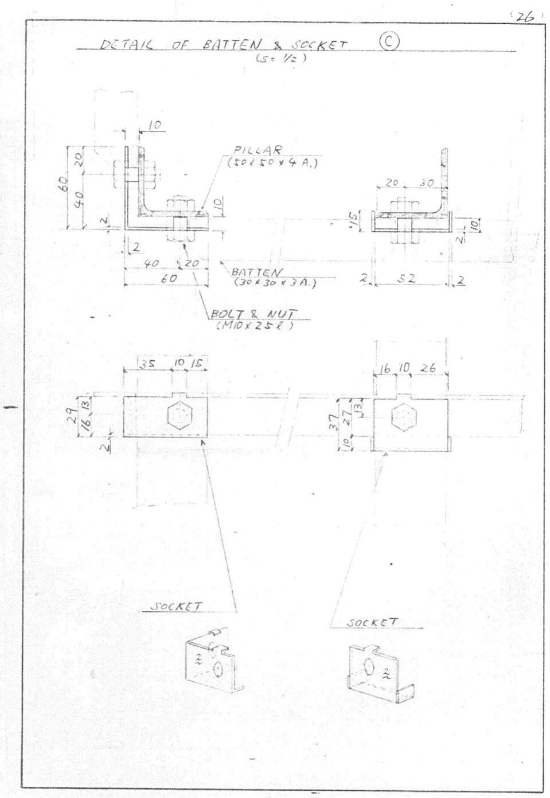

HASP & LOCK DEVICE
MATERIALS: - BSC (CHROMIUM PLATING)
DETAIL
SCREW
(21)


TYPICAL OF STEEL SHELVES (SUS 304)
A.B. ... ADJUSTABLE BATTEN (30 x 30 x 3 A.)
A.S. ... ADJUSTABLE SHELF (1.5mm PL)
MATERIAL; SHELF, BATTEN, NUT & BOLT
ALL STAINLESS STEEL 304
ELEVATION
PLAN
PILLAR
INSULATION
FLOOR TOP
UPP. DK
INOUE REINETSU CO.,LTD.

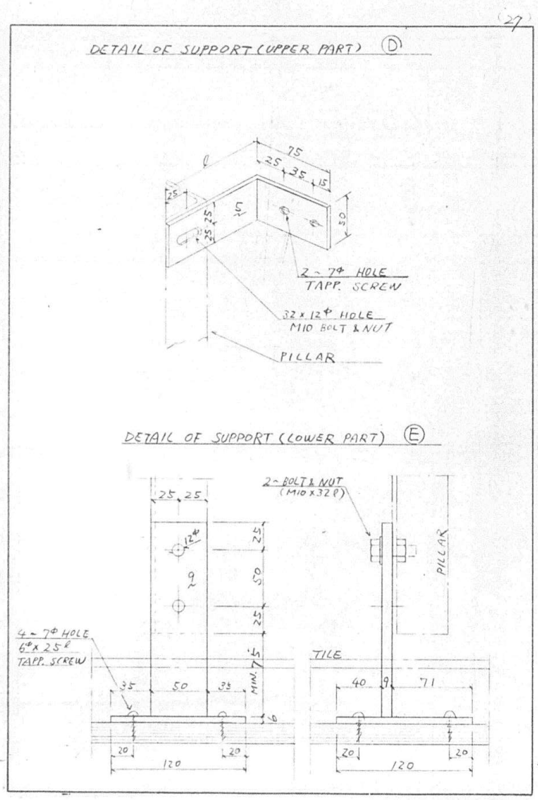
1305



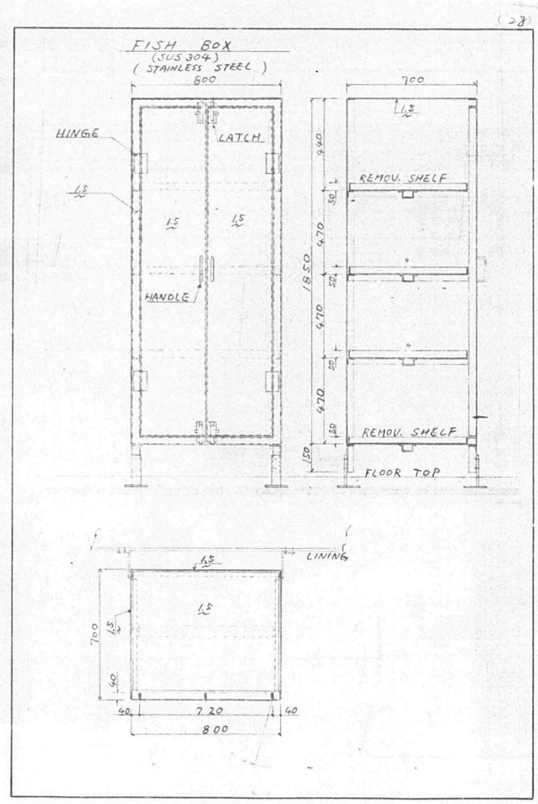
INOUE REINETSU CO.,LTD.



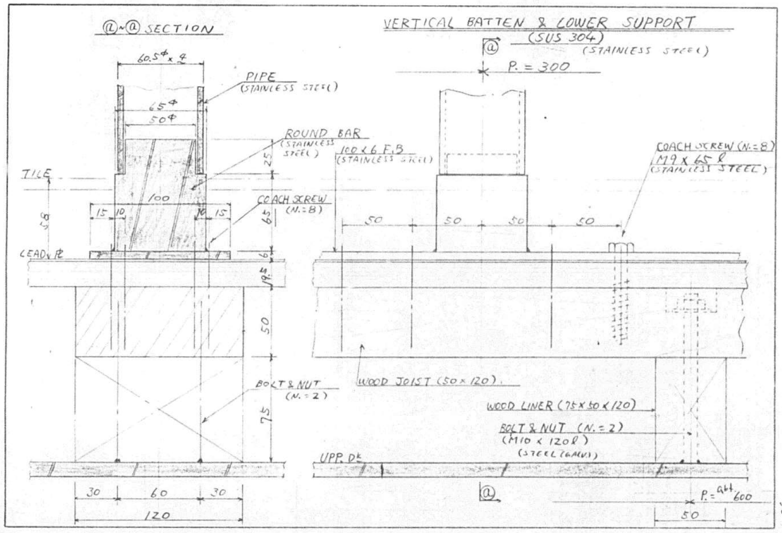
INOUE REINETSU CO.,LTD.



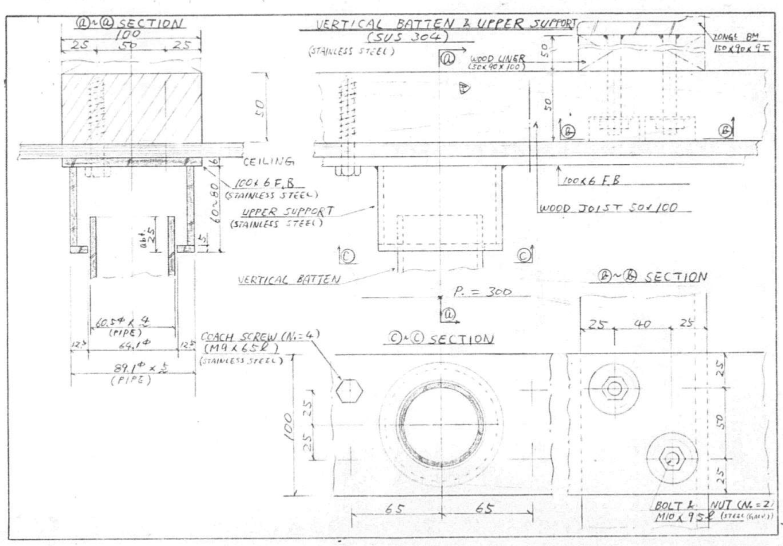
INOUE REINETSU CO.,LTD.



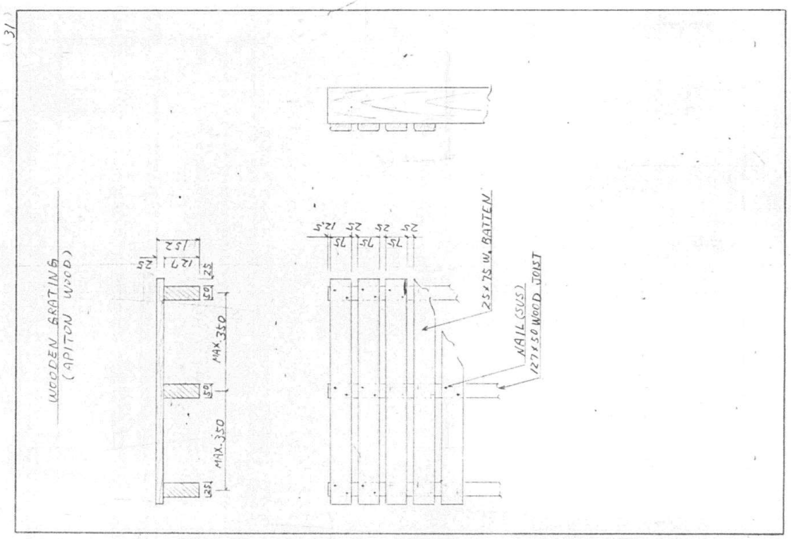
INOUE REINETSU CO.,LTD.



Ⓐ~Ⓐ SECTION
VERTICAL BATTEN & LOWER SUPPORT
(SUS 304)
(STAINLESS STEEL)
P. = 300
PIPE
(STAINLESS STEEL)
ROUND BAR
100 x 6 F.B
COACH SCREW (N.=8)
M9 x 65 ℓ
(STAINLESS STEEL)
TILE
LEAD
BOLT & NUT
(N.=2)
WOOD JOIST (50 x 120)
WOOD LINER (75 x 50 x 120)
BOLT & NUT (N.=2)
(M10 x 120ℓ)
UPP.DK
120

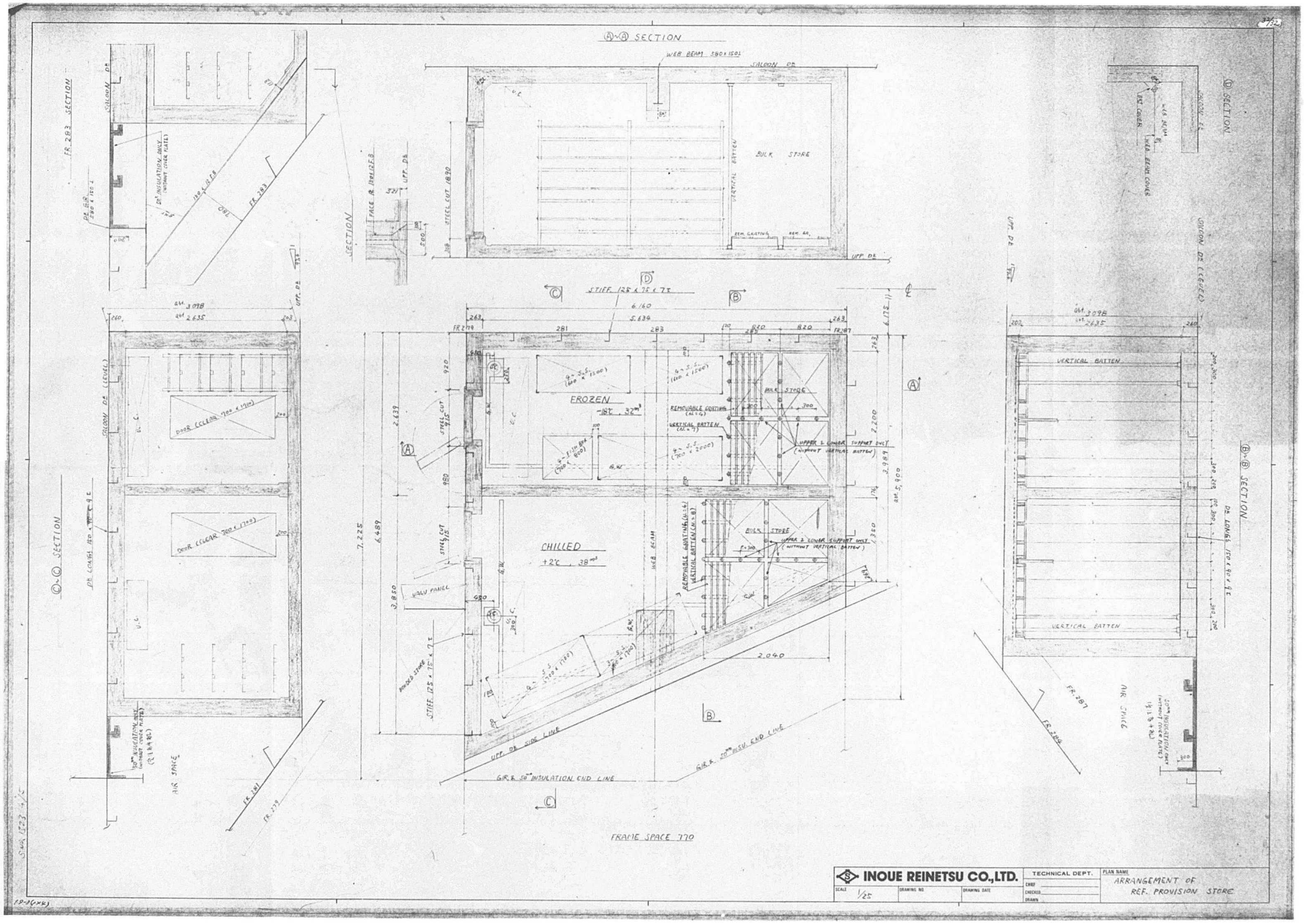


Ⓐ~Ⓐ SECTION
VERTICAL BATTEN & UPPER SUPPORT
(SUS 304)
(STAINLESS STEEL)
WOOD LINER
CEILING
100 x 6 F.B
(STAINLESS STEEL)
UPPER SUPPORT
(STAINLESS STEEL)
WOOD JOIST 50 x 100
VERTICAL BATTEN
P. = 300
Ⓑ~Ⓑ SECTION
Ⓒ~Ⓒ SECTION
60.5Φ x 4
(PIPE)
89.1Φ x 5
(PIPE)
COACH SCREW (N.=4)
(M9 x 65ℓ)
(STAINLESS STEEL)
BOLT & NUT (N.=2)
M10 x 95ℓ



WOODEN GRATING
(APITON WOOD)
25 x 75 W. BATTEN
NAIL (SUS)
127 x 50 WOOD JOIST
MAX. 350

1307



A-A SECTION
SALOON DK
BULK STORE
VERTICAL BATTEN
FROZEN
-18°C , 32m³
CHILLED
+2°C , 38m³
REMOVABLE GRATING
UPPER & LOWER SUPPORT ONLY
C-C SECTION
DOOR CLEAR 700 x 1700
AIR SPACE
B-B SECTION
D SECTION
FRAME SPACE 770
INOUE REINETSU CO.,LTD.
TECHNICAL DEPT.
SCALE 1/25
ARRANGEMENT OF
REF. PROVISION STORE

1308

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	AUG/8 1985	OTTS/MES-879					OCT/8 1985	—
A	NOV/13 1985	OTT/MES-1035						

APPROVAL OF OWNER & REGULATORY BODIES

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO. 1323	DOCTOR LYKES	NO. 1158	JAMES LYKES
NO. 1324	ALMERIA LYKES	NO. 1159	JOSEPH LYKES
NO. 1325	TILLIE LYKES	NO. 1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER

SHIP'S NO. NO.1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC. CHIEF
ASSIST. CHIEF
CHARGE ENGR.
DATE (TEL 2236)

諸倉庫配置及び詳細
ARR. OF STORES ETC.

JOB NO. TS1323/24/25
JOBCLASSIF. NO. D 12
SCALE ~
LYKES REF. NO. 340302
MITSUI DRAWING NO. 4112001

(37 SHEETS WITH COVER)

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5. OCT. 1986	PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	T. Sakata

GENERAL NOTE

DWG. NO. 4112001

REFERENCE

NO.	REF. NO	DWG NO	DWG NAME
1	360601	4109103	RAT PROOFING
2	480007	4100025	PIPING ARRANGEMENT IN STEERING GEAR ROOM

DWG. NO. 4112001

1309

5

LIST OF FITTING FOR STORES ETC.

MARK	ITEM	手配部署 (整理 NO.)	LOCATION: DECK	LOCATION: SPACE
Ⓐ	WOODEN SHELF (1-TIER)	船工-船(品) 手配	UPP. DK.	BOATSN'S STORE
			2ND. DK.	STEER. GEAR RM.
Ⓑ	DO.	〃	UPP. DK.	DK. STORE
Ⓒ	WOODEN SHELF (2-TIER)	〃	NAV. BR. DK.	DK. CHAIRS
			PASS. DK.	DK. CHAIRS, GAME EQUIP. CLOSET
			BOAT DK.	CLOSET
			CREW DK.	CLOSET
			SALOON DK.	STEWD. OFFICE, GAMES
			UPP. DK.	LKR., BONDED STORE
			2ND. DK.	LKR. FIRE STATION
Ⓓ	WOODEN SHELF (3-TIER)	〃	PASS. DK.	SPARE BULB LKR.
Ⓔ	COMB. STEEL & WOOD SHELF (2-TIER)	〃	SR. OFFR. DK.	BAGG. LKR.
			PASS. DK.	BAGG. LKR. (2)
			BOAT DK.	BAGG. LKR.
			CREW DK.	BAGG. LKR.
Ⓕ	COMB. ALUMI. & INCOMBUSTIBLE HARD BOARD SHELF (3-TIER)	〃	2ND. DK.	CLEAN LINEN LKR.
Ⓖ	ALUMI. SHELF (3-TIER)	〃	UPP. DK.	SLOP CHEST
Ⓗ	STEEL SHELF (5-TIER)	〃	〃	DRY PROV. STORE
Ⓘ	STEEL SHELF (2-TIER)	〃	〃	PAINT RM.
Ⓙ	WORKING TABLE	〃	〃	PAINT RM.
Ⓚ	WOODEN GRATING	船工-船(品) 手配	SR. OFFR. DK.	BAGG. LKR.
			PASS. DK.	BAGG. LKR. (2)
			BOAT DK.	BAGG. LKR.
			CREW DK.	BAGG. LKR.
	SPAIR DISHES IN BOXES	〃	SALOON DK.	STEWD. OFFICE
	BULK STOWAGE	〃	UPP. DK.	DRY PROV. STORE
			2ND. DK.	CLEAN LINEN LKR. DIRTY LINEN LKR.
	BAG HOOK	〃	〃	DIRTY LINEN LKR.

6

船舶設計標準

木製棚 (1段奥行 1.200以上) Ⓐ MS 44601-13/14

WOODEN SHELF (1-TIER)

BOATSN'S STORE
STEER. GEAR RM.

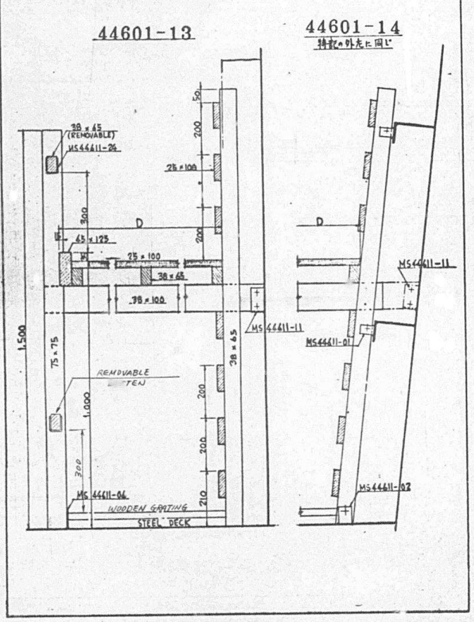


図14

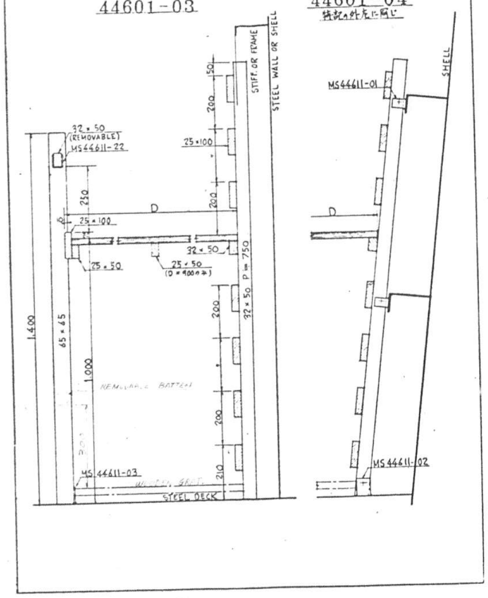
7

船舶設計標準

木製棚 (1段奥行 900以下) Ⓑ MS 44601-03/04

WOODEN SHELF (1-TIER)

DECK STORE (UPP. DK.)



8

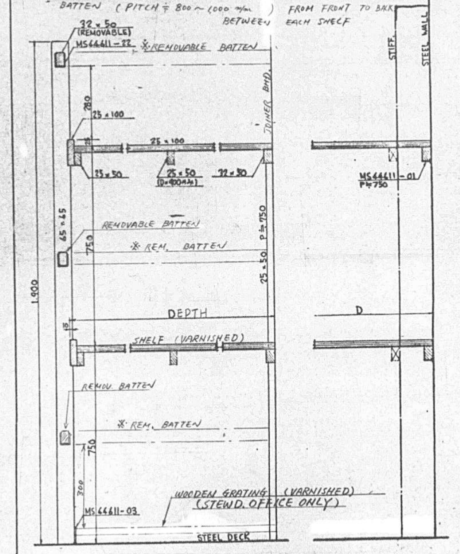
船舶設計標準

木製棚 (2段奥行 900以下) Ⓒ MS 44601-21/22

WOODEN SHELF (2-TIER)

DECK CHAIRS (NAV. BR. DK.,), ※GAME EQUIP. CLOSET (PASS. DK.)
CLOSET (BOAT DK., CREW DK.), ※STEWD OFFICE (SALOON DK.),
LKR. (UPP. DK., 2ND. DK.), ※BONDED STORE (UPP. DK.) GAMES (SALOON DK.)
※FIRE STATION (2ND DK) 44601-21 ※DECK CHAIRS (PASS. DK) 44601-22 特記の外左に同じ

NOTE/
1. ※ MARKED ROOM TO BE PROVIDED WITH ※ MARKED REMOVABLE BATTEN (PITCH ≒ 800～1000 m/m) FROM FRONT TO BACK BETWEEN EACH SHELF



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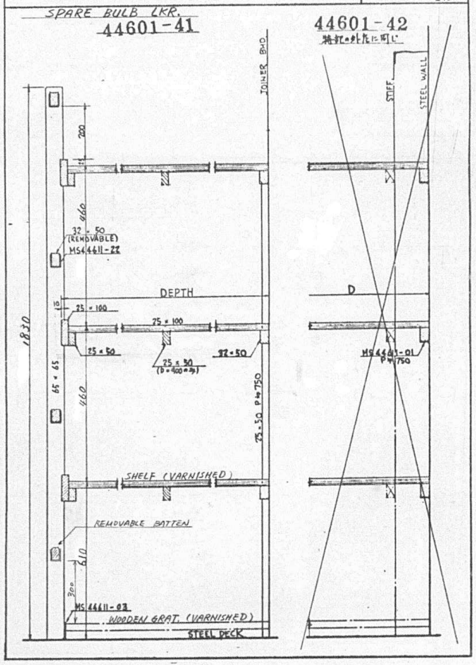
1310

9

船舶設計標準

木製棚 (3段奥行 900以下) WOODEN SHELF (3-TIER) Ⓓ

MS 44601-41/42

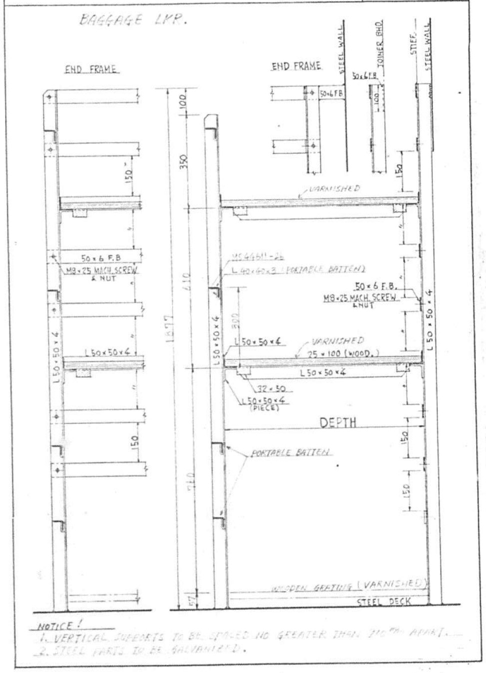


10

船舶設計標準

鋼・木混製棚 (2段) COMBINED STEEL & WOOD SHELF (2-TIER) Ⓔ

MS 44603-01



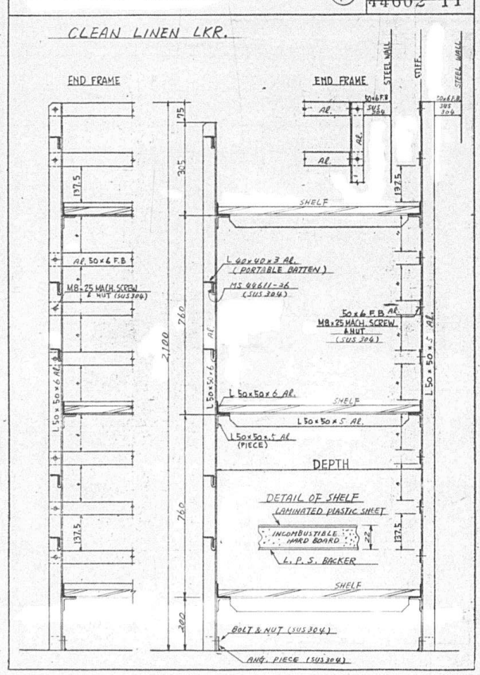
㊤14

11

船舶設計標準

COMBINED ALUMI. & INCOMBUSTIBLE HARD BOARD SHELF (2-TIER) Ⓕ

MS 44602-11

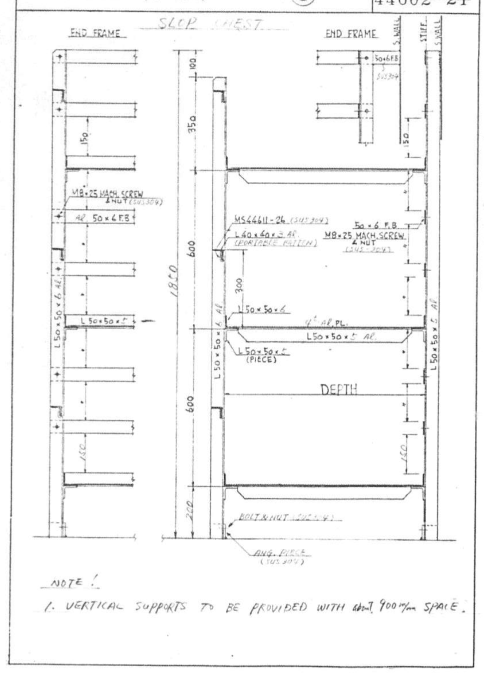


12

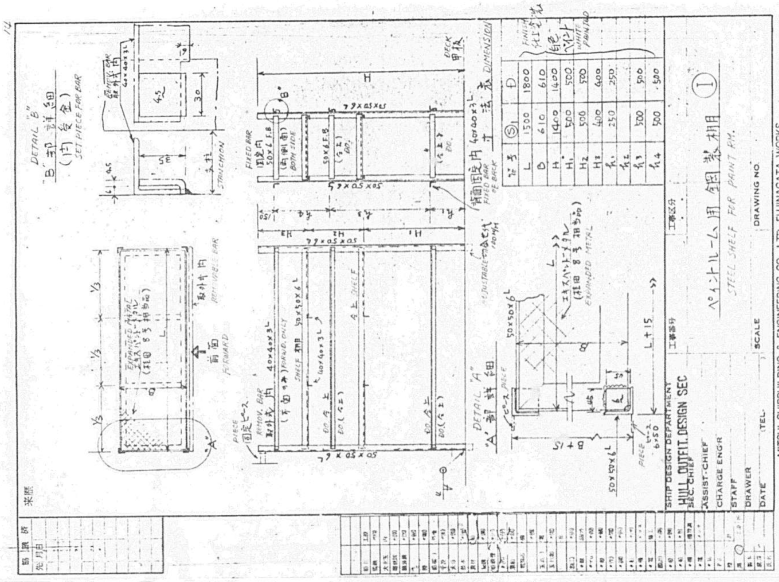
船舶設計標準

アルミ棚 (3段) ALUMI. SHELF (3-TIER) Ⓖ

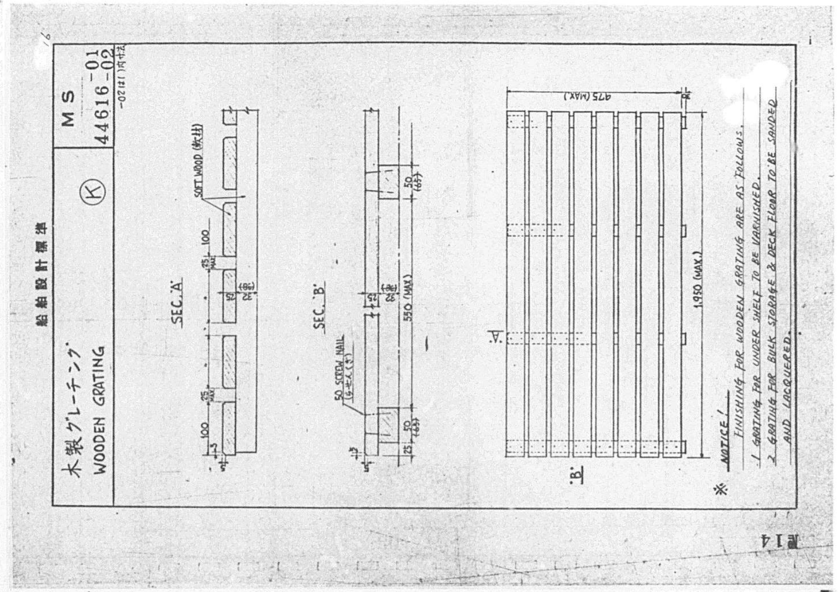
MS 44602-21



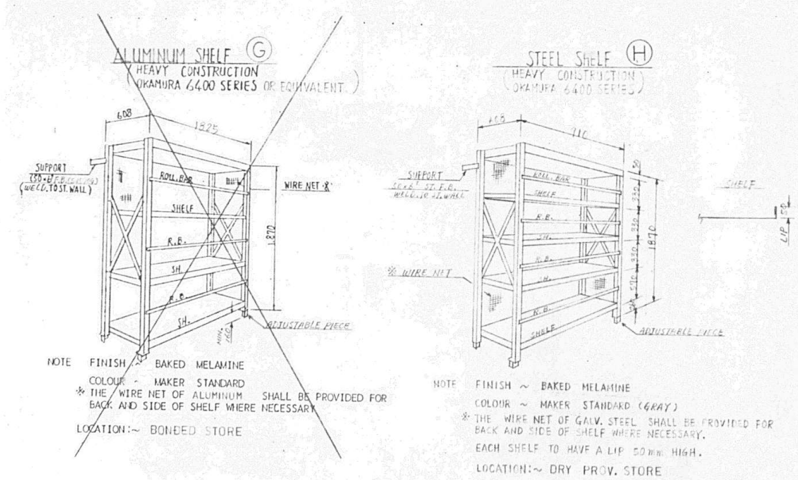
1311



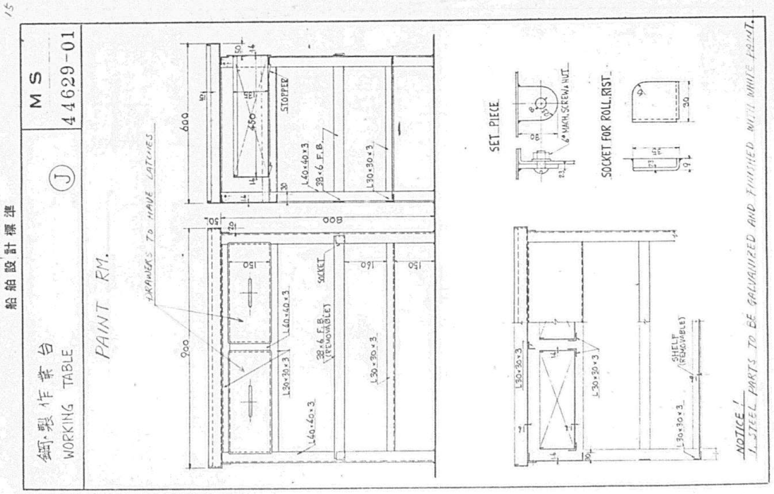
DETAIL "B"
DETAIL "A"
ペイントルーム用 鋼製棚
STEEL SHELF FOR PAINT RM.
MITSUI SHIPBUILDING & ENGINEERING CO., LTD. FUJINAGATA WORKS
HULL OUTFIT DESIGN SEC



船舶設計標準
木製グレーチング
WOODEN GRATING
MS
44616-01
44616-02
SEC.'A'
SEC.'B'
NOTICE!
FINISHING FOR WOODEN GRATING ARE AS FOLLOWS.
1. GRATING FOR UNDER SHELF TO BE VARNISHED.
2. GRATING FOR BULK STORAGE & DECK FLOOR TO BE SANDED AND LACQUERED.

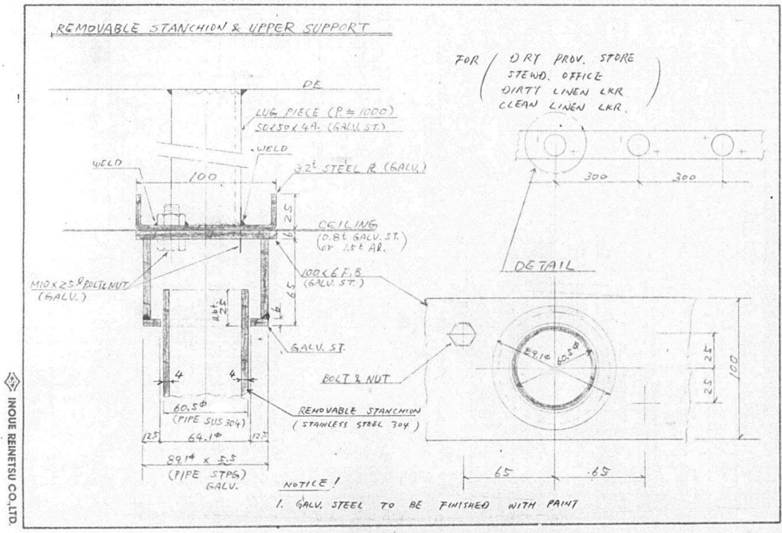


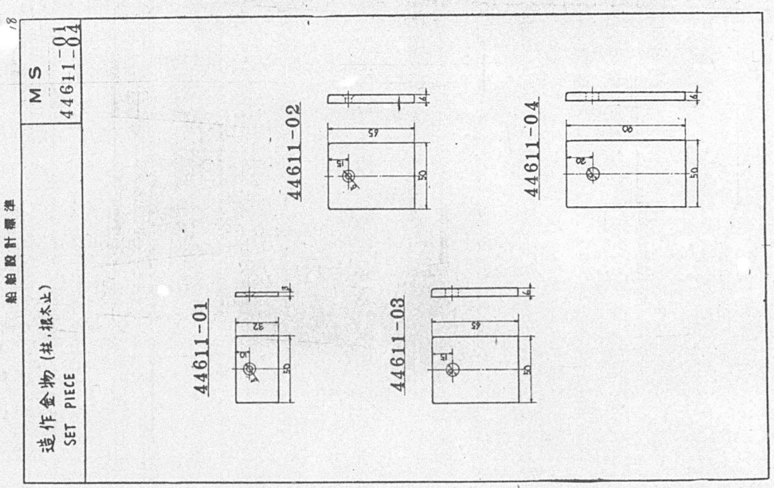
ALUMINUM SHELF (G)
HEAVY CONSTRUCTION
OKAMURA 6400 SERIES OR EQUIVALENT.
NOTE FINISH ~ BAKED MELAMINE
COLOUR ~ MAKER STANDARD
※ THE WIRE NET OF ALUMINUM SHALL BE PROVIDED FOR BACK AND SIDE OF SHELF WHERE NECESSARY.
LOCATION:~ BONDED STORE
STEEL SHELF (H)
HEAVY CONSTRUCTION
OKAMURA 6400 SERIES
NOTE FINISH ~ BAKED MELAMINE
COLOUR ~ MAKER STANDARD (GRAY)
※ THE WIRE NET OF GALV. STEEL SHALL BE PROVIDED FOR BACK AND SIDE OF SHELF WHERE NECESSARY.
EACH SHELF TO HAVE A LIP 50mm HIGH.
LOCATION:~ DRY PROV. STORE

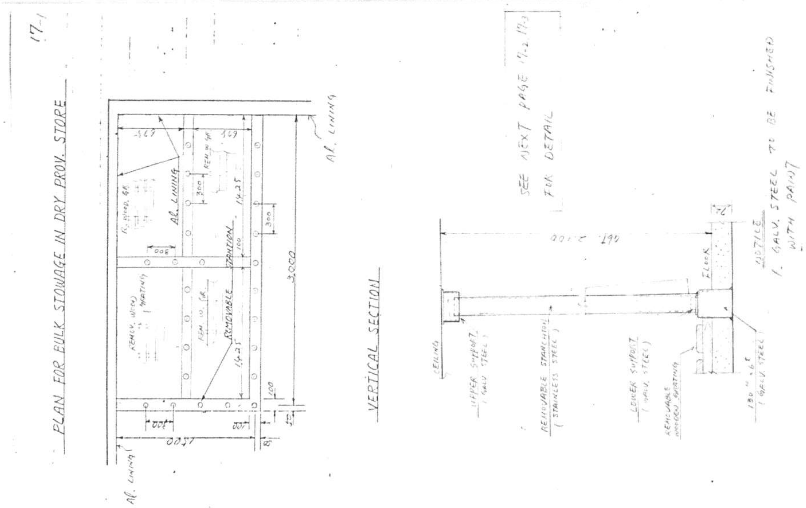


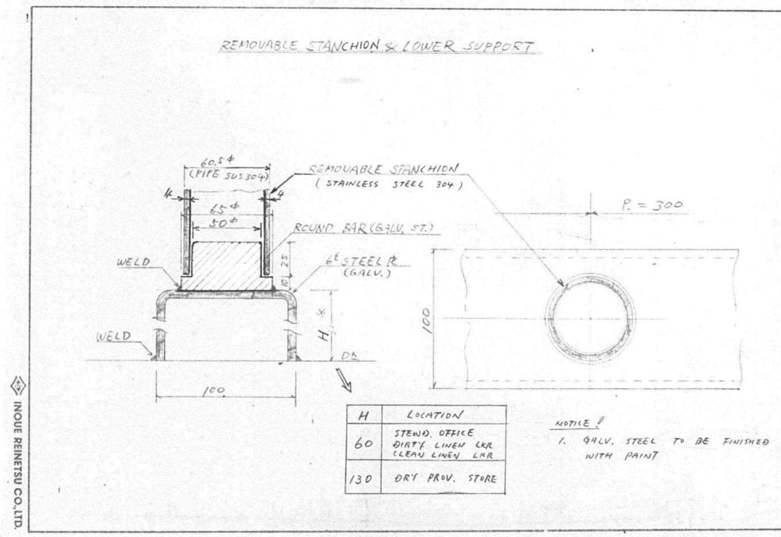
船舶設計標準
鋼製作業台
WORKING TABLE
MS
44629-01
PAINT RM.
SET PIECE
SOCKET FOR ROLL RST.
NOTICE!
1. STEEL PARTS TO BE GALVANIZED AND FINISHED WITH WHITE PAINT.

1312

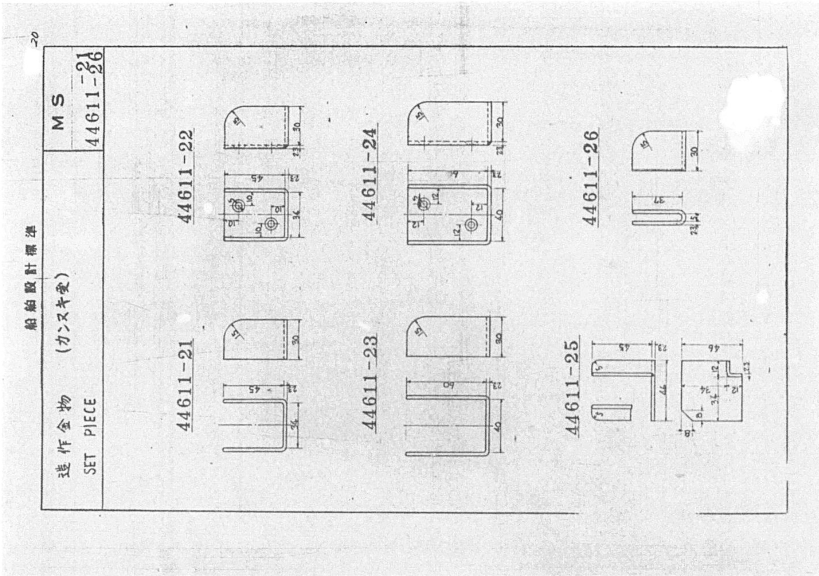

REMOVABLE STANCHION & UPPER SUPPORT
FOR (DRY PROV. STORE
STEWD. OFFICE
DIRTY LINEN LKR
CLEAN LINEN LKR)
LUG PIECE (P ≒ 1000)
WELD
STEEL PL (GALV.)
CEILING
M10×25ℓ BOLT & NUT (GALV.)
GALV. ST.
BOLT & NUT
REMOVABLE STANCHION (STAINLESS STEEL 304)
60.5φ (PIPE SUS 304)
89.1φ × 5.5 (PIPE STPG) GALV.
DETAIL
NOTICE!
1. GALV. STEEL TO BE FINISHED WITH PAINT
INOUE REINETSU CO.,LTD.
17-2

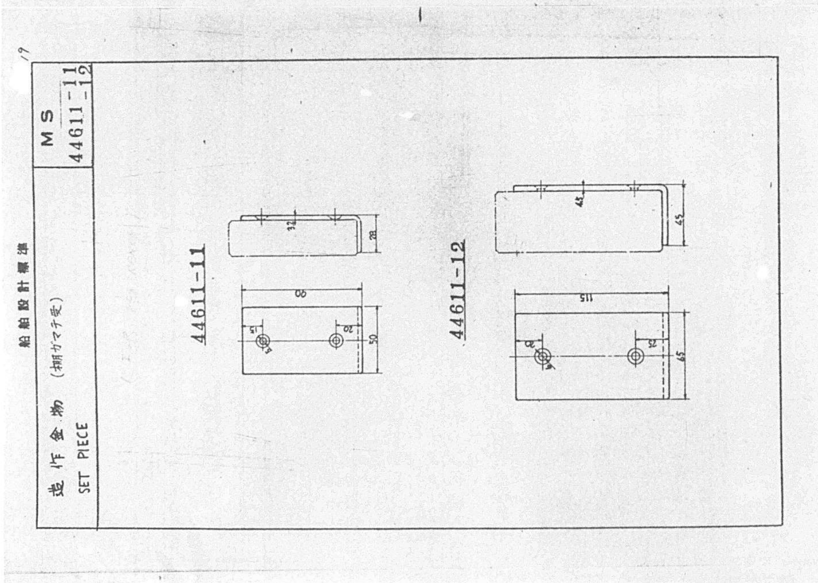

船舶設計標準
造作金物(柱・扱太止)
SET PIECE
MS
44611-01
44611-04
44611-01
44611-02
44611-03
44611-04

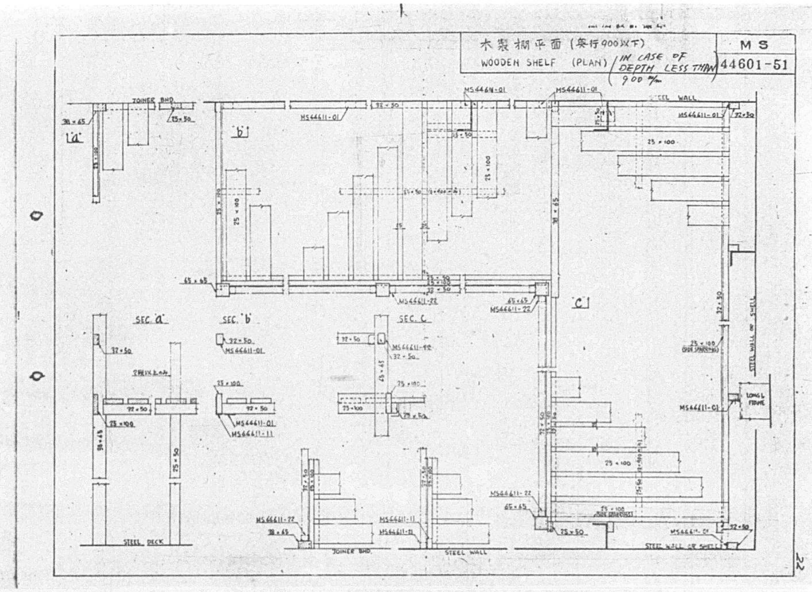

17-1
PLAN FOR BULK STOWAGE IN DRY PROV. STORE
VERTICAL SECTION
SEE NEXT PAGE (17-2, 17-3) FOR DETAIL
NOTICE
1. GALV. STEEL TO BE FINISHED WITH PAINT
AL. LINING
REMOVABLE STANCHION
3000
1500

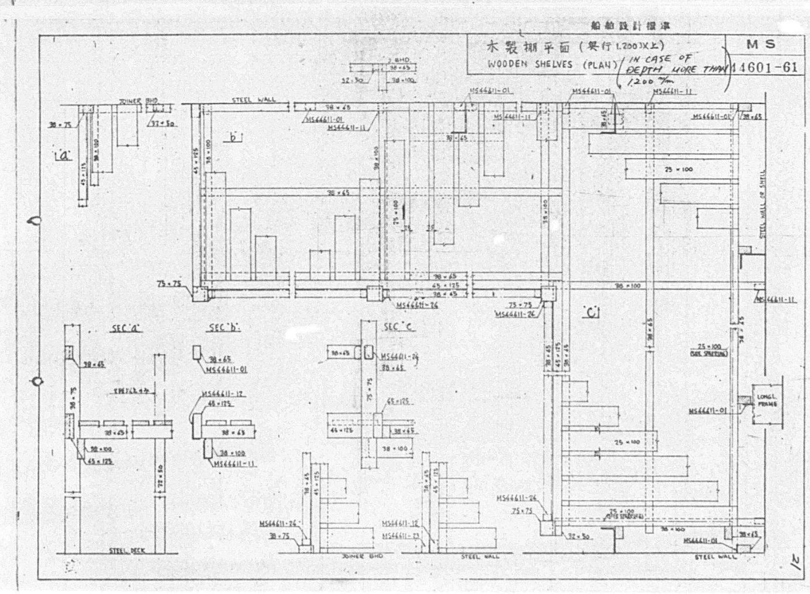

REMOVABLE STANCHION & LOWER SUPPORT
60.5φ (PIPE SUS 304)
REMOVABLE STANCHION (STAINLESS STEEL 304)
ROUND BAR (GALV. ST.)
WELD
STEEL PL (GALV.)
P. = 300
DK
H | LOCATION
60 | STEWD. OFFICE, DIRTY LINEN LKR, CLEAN LINEN LKR
130 | DRY PROV. STORE
NOTICE!
1. GALV. STEEL TO BE FINISHED WITH PAINT
INOUE REINETSU CO.,LTD.
17-3

1313

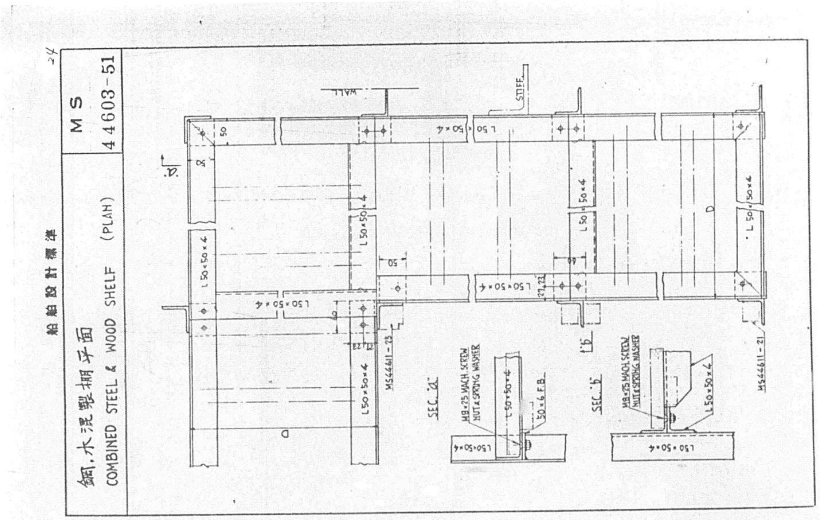

船舶設計標準
造作金物 (カンヌキ受)
SET PIECE
MS
44611-21
-26
44611-21
44611-22
44611-23
44611-24
44611-25
44611-26


船舶設計標準
造作金物 (棚ガマチ受)
SET PIECE
MS
44611-11
-12
44611-11
44611-12

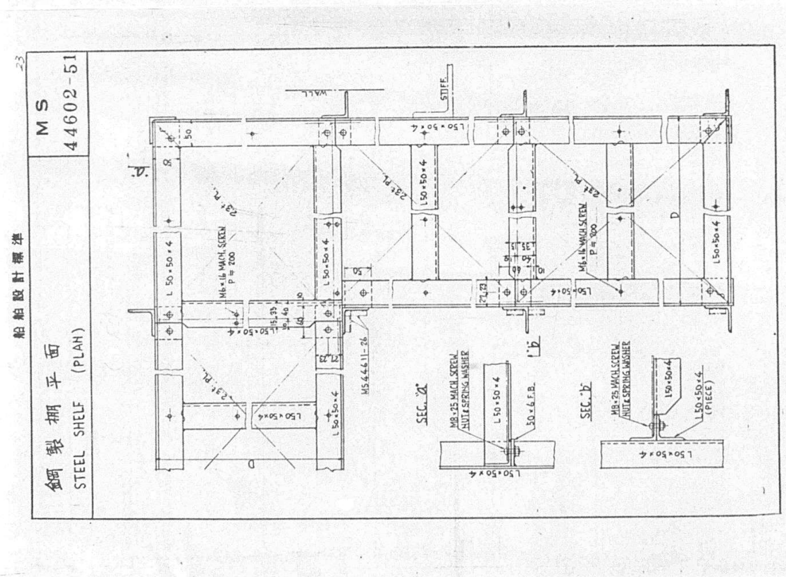

木製棚平面 (奥行900以下)
WOODEN SHELF (PLAN) (IN CASE OF DEPTH LESS THAN 900 m/m)
MS
44601-51
SEC 'a'
SEC 'b'
SEC 'c'
STEEL DECK
STEEL WALL


船舶設計標準
木製棚平面 (奥行1,200以上)
WOODEN SHELVES (PLAN) (IN CASE OF DEPTH MORE THAN 1,200 m/m)
MS
44601-61
SEC 'a'
SEC 'b'
SEC 'c'
STEEL DECK
STEEL WALL

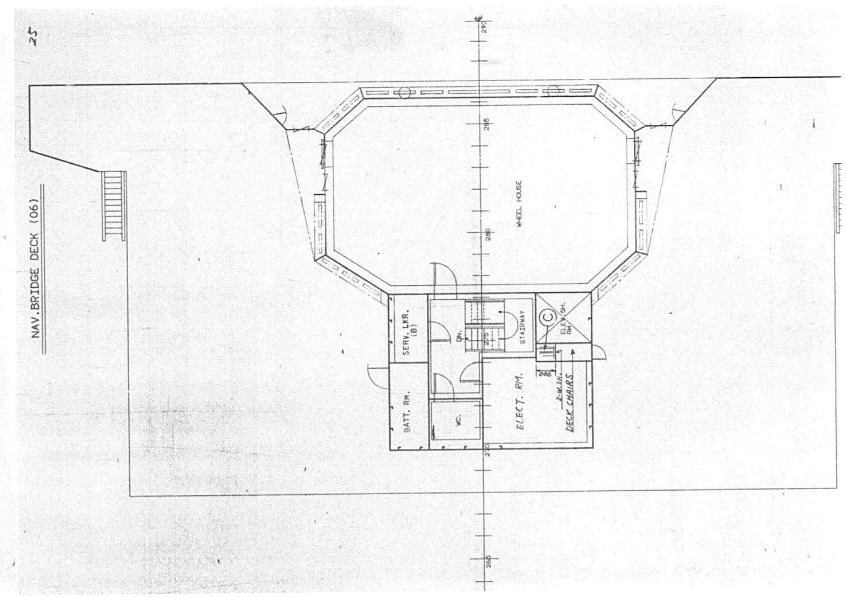
1314



船舶設計標準
MS
44603-51
鋼.木混製棚平面
COMBINED STEEL & WOOD SHELF (PLAN)
WALL
STIFF.
L50×50×4
SEC 'a'
SEC 'b'
M8×25 MACH. SCREW NUT & SPRING WASHER
50×6 F.B.
MS44611-23
MS44611-21



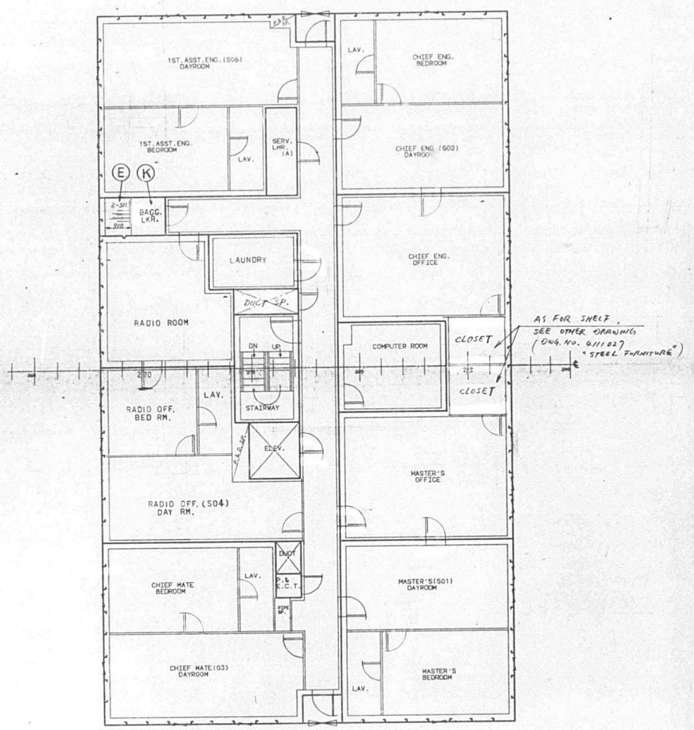
船舶設計標準
MS
44602-51
鋼製棚平面
STEEL SHELF (PLAN)
WALL
STIFF.
L50×50×4
2.3t PL
M6×16 MACH. SCREW P=200
SEC 'a'
SEC 'b'
M8×25 MACH. SCREW NUT & SPRING WASHER
50×6 F.B.
L50×50×4 (PIECE)
MS44611-26



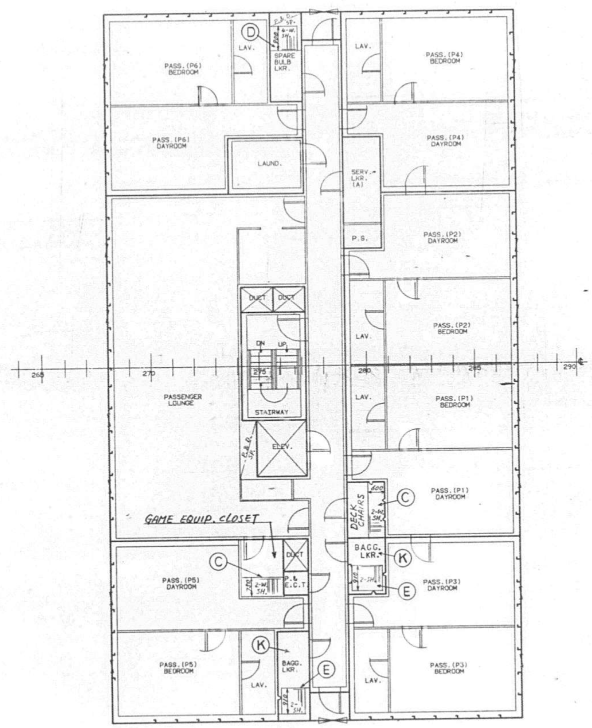
NAV. BRIDGE DECK (06)
WHEEL HOUSE
STAIRWAY
SERV. LKR. (B)
BATT. RM.
ELECT. RM.
DECK CHAIRS
W.C.

1315

SR. OFFICER'S DECK (05)

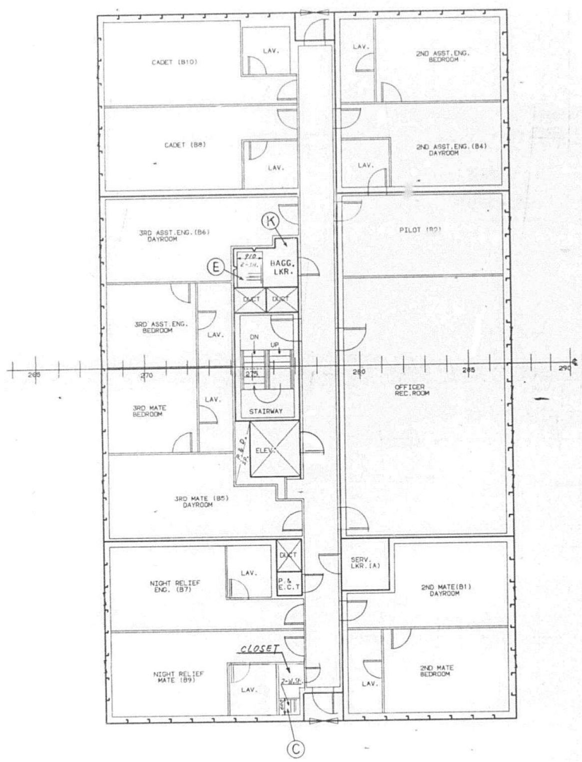


PASSENGER DECK (04)

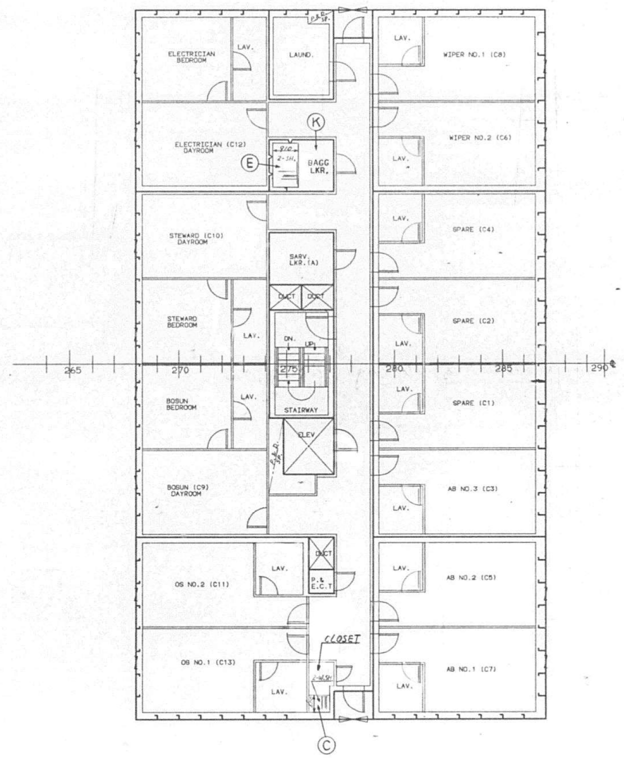


1316

BOAT DECK (03)

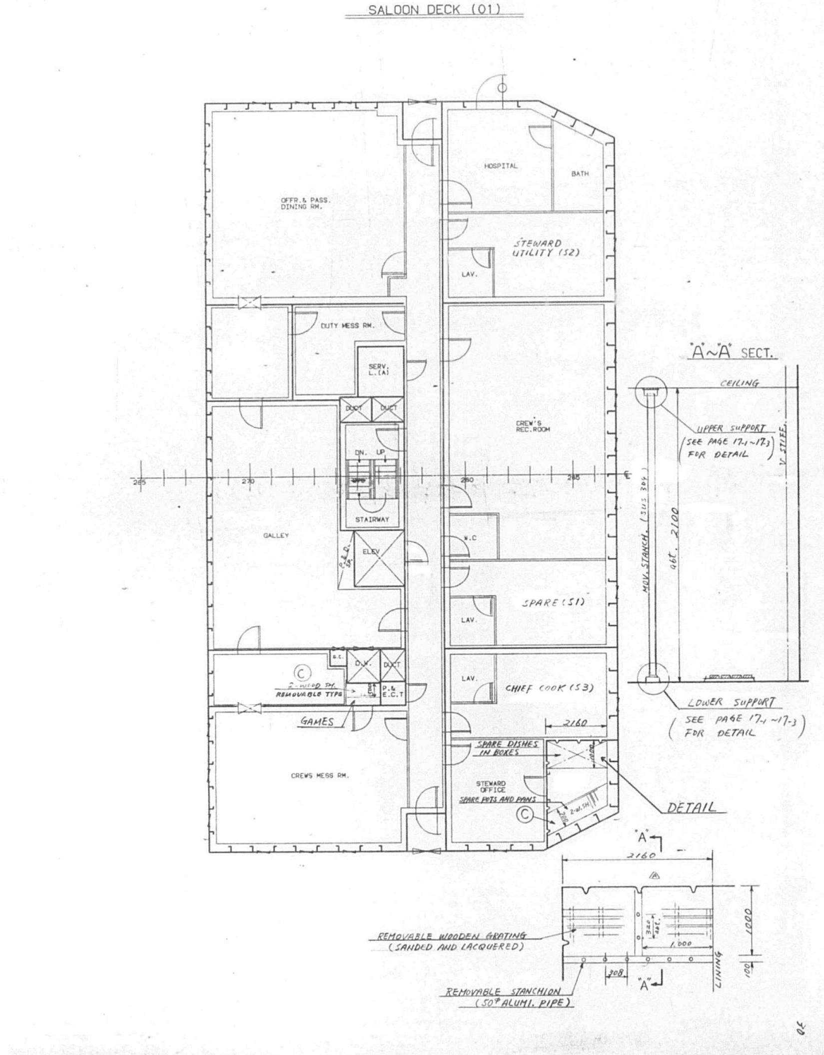


CREW DECK (02)

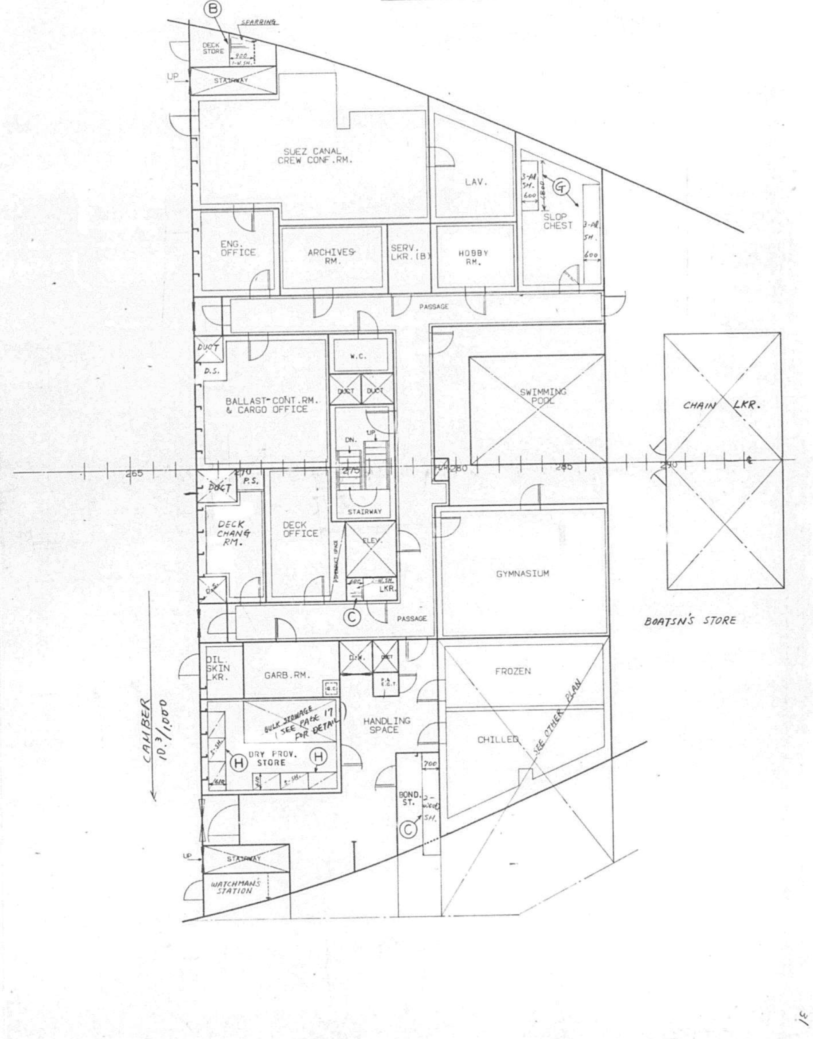


1317

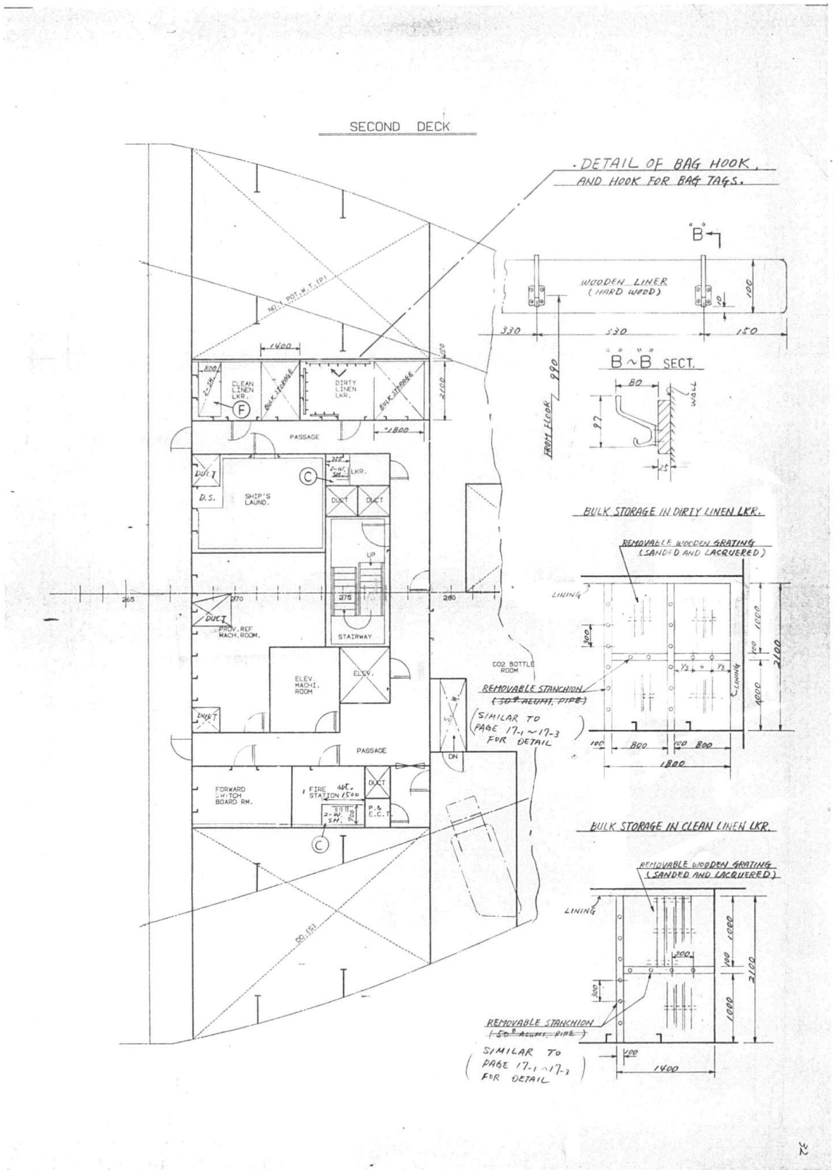
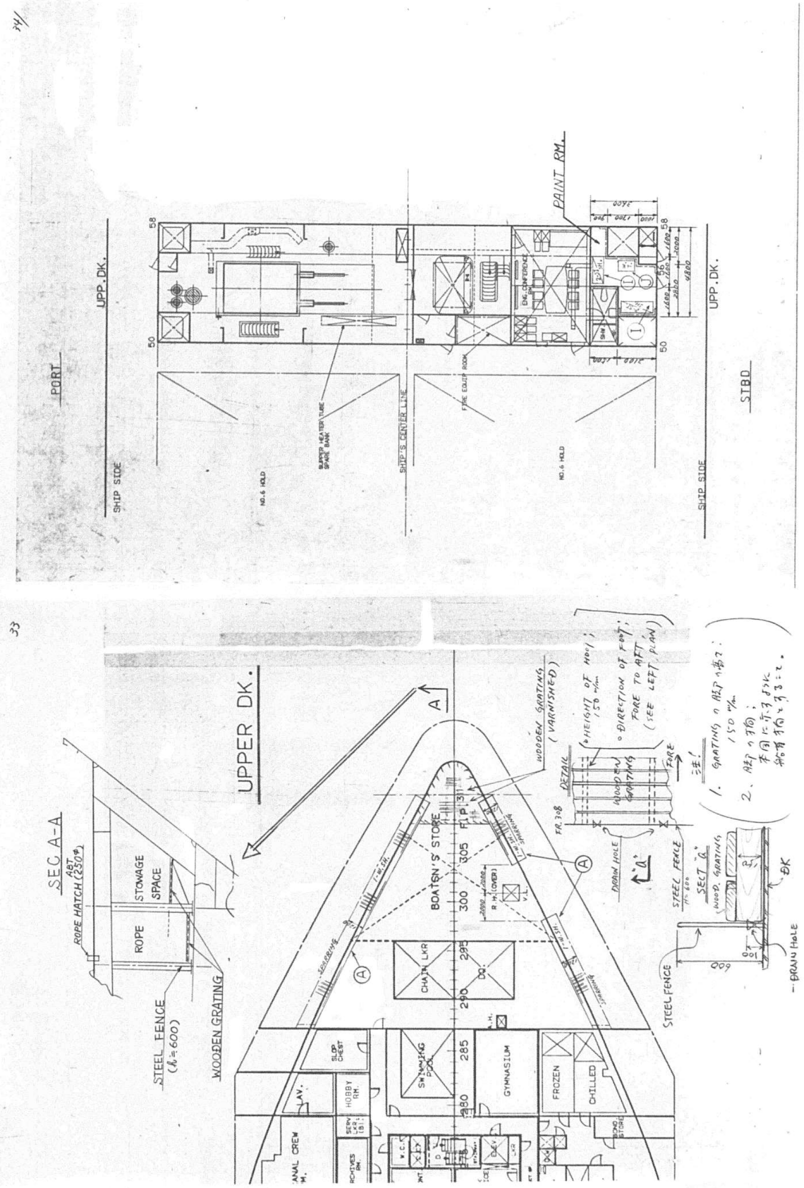
SALOON DECK (01)



UPPER DECK

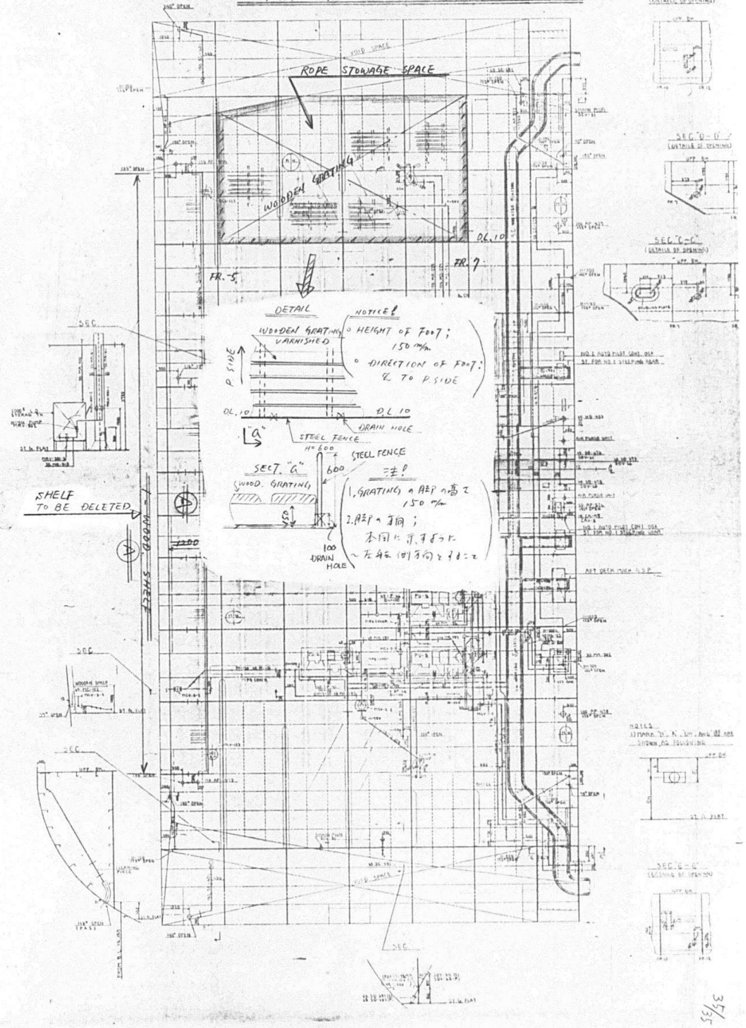


1318


SECOND DECK
DETAIL OF BAG HOOK, AND HOOK FOR BAG TAGS.
WOODEN LINER (HARD WOOD)
B~B SECT.
FROM FLOOR 990
WALL
BULK STORAGE IN DIRTY LINEN LKR.
REMOVABLE WOODEN GRATING (SANDED AND LACQUERED)
LINING
REMOVABLE STANCHION (50φ ALUMI. PIPE)
SIMILAR TO PAGE 17-1 ~17-3 FOR DETAIL
BULK STORAGE IN CLEAN LINEN LKR.
REMOVABLE WOODEN GRATING (SANDED AND LACQUERED)
REMOVABLE STANCHION (50φ ALUMI. PIPE)
SIMILAR TO PAGE 17-1 ~17-3 FOR DETAIL
CLEAN LINEN LKR.
DIRTY LINEN LKR.
PASSAGE
SHIP'S LAUND.
DUCT
STAIRWAY
PROV. REF MACH. ROOM
ELEV. MACHI. ROOM
ELEV.
CO2 BOTTLE ROOM
FORWARD SWITCH BOARD RM.
FIRE STATION
PASSAGE

PAINT RM.
UPP. DK.
PORT
STBD
SHIP SIDE
SHIP'S CENTER LINE
UPPER DK.
SEC A-A
ROPE
STOWAGE SPACE
STEEL FENCE
WOODEN GRATING
BOATSN'S STORE
CHAIN LKR
GYMNASIUM
FROZEN
CHILLED
HOBBY RM.
SLOP CHEST
DETAIL
STEEL FENCE
DRAIN HOLE

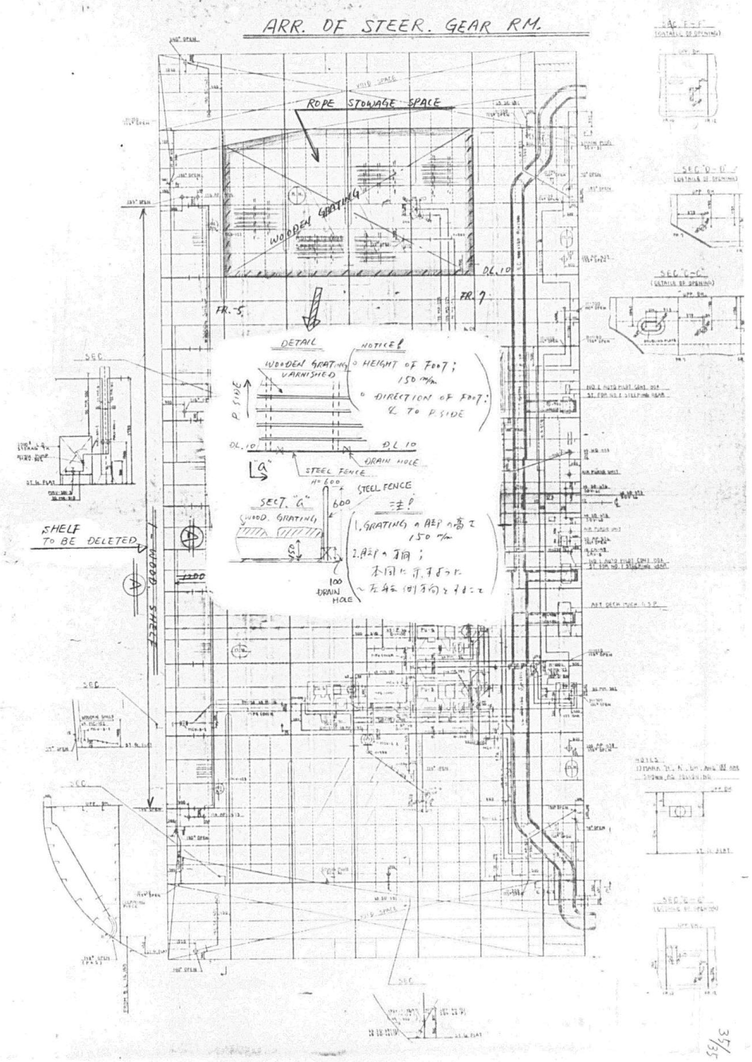
1319

ARR. OF STEER. GEAR RM.



ATTENTION!

FILM NO. 1329 IS WRONG.


ARR. OF STEER. GEAR RM.
ROPE STOWAGE SPACE
WOODEN GRATING
DL. 10
FR. 5
FR. 7
DETAIL
NOTICE!
WOODEN GRATING VARNISHED
HEIGHT OF FOOT; 150 m/m
DIRECTION OF FOOT; ℄ TO P. SIDE
P. SIDE
DRAIN HOLE
"a"
STEEL FENCE H=600
STEEL FENCE
SECT. "a"
WOOD. GRATING
600
150
100
DRAIN HOLE
注!
SHELF TO BE DELETED

1

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	JULY/23 1985	OFTS/MES-767					JULY/5 1985	—
A	NOV/6 1985	TAM/96						

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER

SHIP'S NO. **NO.1325** SHIP'S NAME **TILLIE LYKES**

OUTFITTING DESIGN SECTION
SEC. CHIEF
ASSIST. CHIEF
CHARGE ENG'R
STAMP DESIGN DEPARTMENT
DATE (TEL 2236)

衛生陶器取付要領
PLUMBING FIXTURE.

JOB NO. TS1323/24/25	SCALE	LYKES REF. NO. 360101	MITSUI DRAWING NO. 4111501
JOBCLASSIF. NO. D.11			

(22 SHEETS WITH COVER)

2

PLAN RECORD			
REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5. OCT. 1986	PREPARED FOR S. NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. NO. 1324 AND S. NO. 1325.	T. Sato T. Sakata

3

GENERAL NOTE

1. THE WASH BASIN SHALL BE OF WHITE VITREOUS PORCELAIN AND SHALL BE PROVIDED WITH SYPHON TRAP, RAISE/LOWER STOPPER AND HOT & COLD FRESH WATER MIXING FAUCET.
2. THE BULKHEAD MOUNTED WATER CLOSET SHALL BE OF WHITE VITREOUS PORCELAIN AND PROVIDED WITH PLASTIC SEAT OF FRONT OPEN TYPE, COVER, AND "MARCHANT" TYPE FLUSH VALVE.
3. THE STORM HAND-HOLD RAIL SHALL BE OF PLASTIC AND FITTED FOR EACH OF WATER CLOSETS AND SHOWERS.
4. THE SHOWER SHALL HAVE A FIXED SHOWER HEAD WITH SWIVELING SPRAY HEAD WITH A SINGLE MIXING VALVE TYPE.

DWG. NO. 4111501

4

REFERENCE			
NO.	REF. NO	DWG NO	DWG NAME
1	330001	411001	ACCOMMODATION PLAN

DWG. NO. 4111501

1321

5

LIST OF PLUMBING FIXTURE

DECK	ROOM \ MARK	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Ⓖ	Ⓗ	Ⓘ	Ⓙ
NAV. BR. DK	SERV. LKR(B)										1
	W. C.			1		1					
SR. OFF. DK	MASTER'S(S01) LAV.	1				1	1				
	CH. ENG.(S02) LAV.	1				1	1				
	1ST ASST. ENG.(S06) LAV.	1				1	1				
	R. OFF.(S04) LAV.	1				1	1				
	CH. MATE(S03) LAV.	1				1	1				
	SERV. LKR(A)										1
	LAUNDRY									1	
PASS. DK	PASS.(P3) LAV.	1				1	1				
	PASS.(P1) LAV.	1				1	1				
	PASS.(P2) LAV.	1				1	1				
	PASS.(P4) LAV.	1				1	1				
	PASS.(P6) LAV.	1				1	1				
	PASS.(P5) LAV.	1				1	1				
	SERV. LKR(A)										1
	LAUNDRY									1	
BOAT DK	2ND MATE(B1) LAV.	1				1	1				
	PILOT(B2) LAV.	1				1	1				
	2ND ASST. ENG.(B4) LAV.	1				1	1				
	CADET(B10) LAV.	1				1	1				
	CADET(B8) LAV.	1				1	1				
	3RD ASST. ENG.(B6) LAV.	1				1	1				
	3RD MATE(B5) LAV.	1				1	1				
	NIGHT RELIEF ENG.(B7) LAV.	1				1	1				
	NIGHT RELIEF ENG.(B9) LAV.	1				1	1				
	SERV. LKR(A)										1
CREW DK	AB NO.1(C7) LAV.	1				1	1				
	AB NO.2(C5) LAV.	1				1	1				
	AB NO.3(C3) LAV.	1				1	1				
	SPARE(C1) LAV.	1				1	1				
	SPARE(C2) LAV.	1				1	1				

共 (7) 92010-2. A4. ト. 80.000 52.9
三井造船株式会社

6

LIST OF PLUMBING FIXTURE

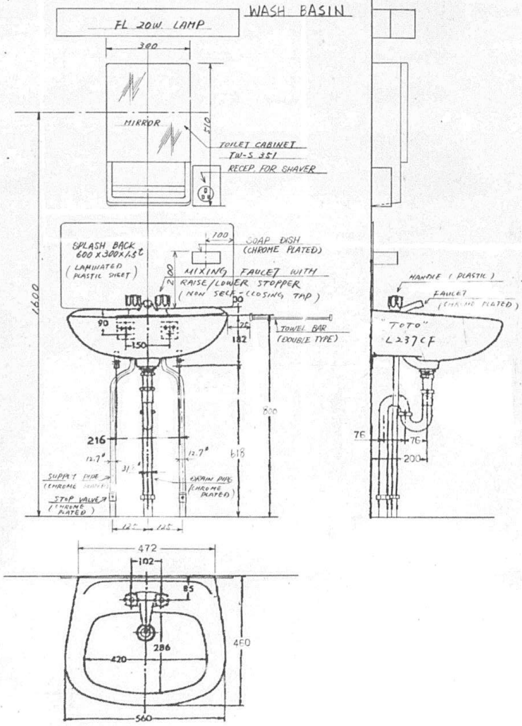
DECK	ROOM \ MARK	Ⓐ	Ⓑ	Ⓒ	Ⓓ	Ⓔ	Ⓕ	Ⓖ	Ⓗ	Ⓘ	Ⓙ
CREW DK	SPARE(C4) LAV.	1				1	1				
	WIPER NO.2(C6) LAV.	1				1	1				
	WIPER NO.1(C8) LAV.	1				1	1				
	ELECT.(C12) LAV.	1				1	1				
	STEWARD(C10) LAV.	1				1	1				
	BOSUN(C9) LAV.	1				1	1				
	OS NO.2(C11) LAV.	1				1	1				
	OS NO.1(C13) LAV.	1				1	1				
	LAUNDRY									1	
	SERV. LKR(A)										1
SALOON DECK	CH. COOK(S3) LAV.	1				1	1				
	SPARE(S1) LAV.	1				1	1				
	STEWARD UTIL.(S2) LAV.	1				1	1				
	HOSPITAL BATH	1				1		1	1		
	SERV. LKR(A)										1
	W. C.			1		1					
	GALLEY				1						
UPP. DK	SWIMM. POOL RM						1				
	SERV. LKR(B)										1
	SUEZ CANAL CREW CONF. LAV.		2			2	1				
	W. C.			1		1					
	DK CHANG. RM			1							
SECOND DK	SHIP'S LAUNDRY									2	
ENGINE RM.	ENGR. CHANG. RM.			1							
	ENGR. CONFERENCE ROOM TOIL.	1				1	1				
	TOIL.					1					
	ENGINE RM.			1							
	TOTAL	38	2	6	1	44	39	1	1	5	7

共 (7) 92010-2. A4. ト. 80.000 52.9
三井造船株式会社

7

洗面器 (A)

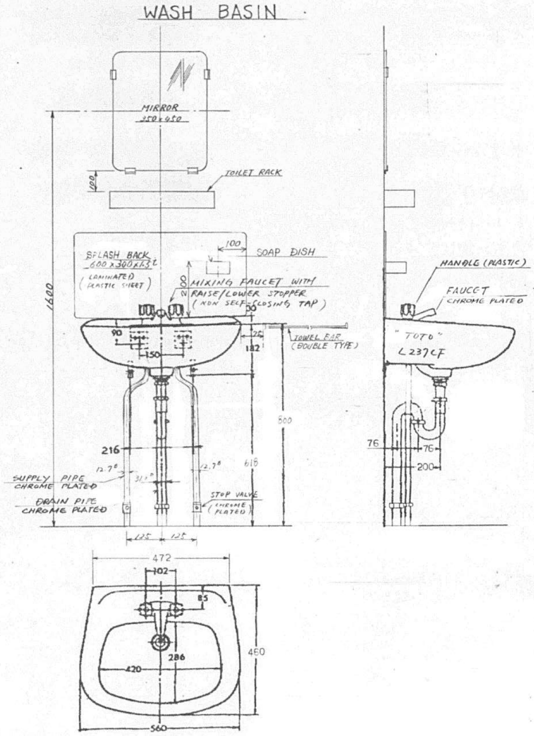
WASH BASIN



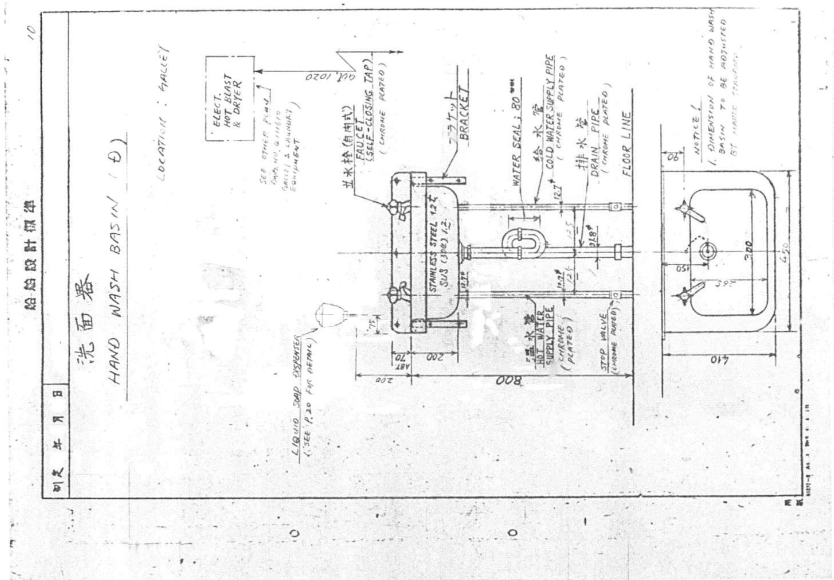
8

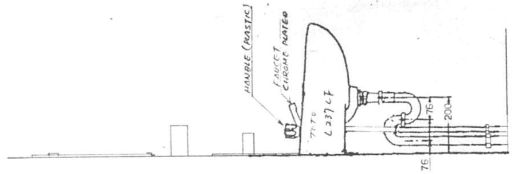
洗面器 (B)

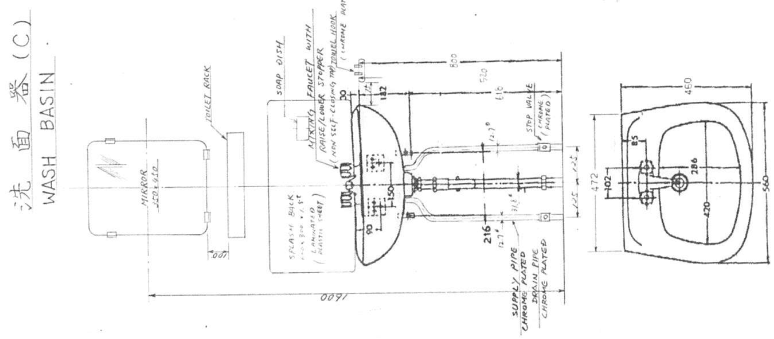
WASH BASIN



1322

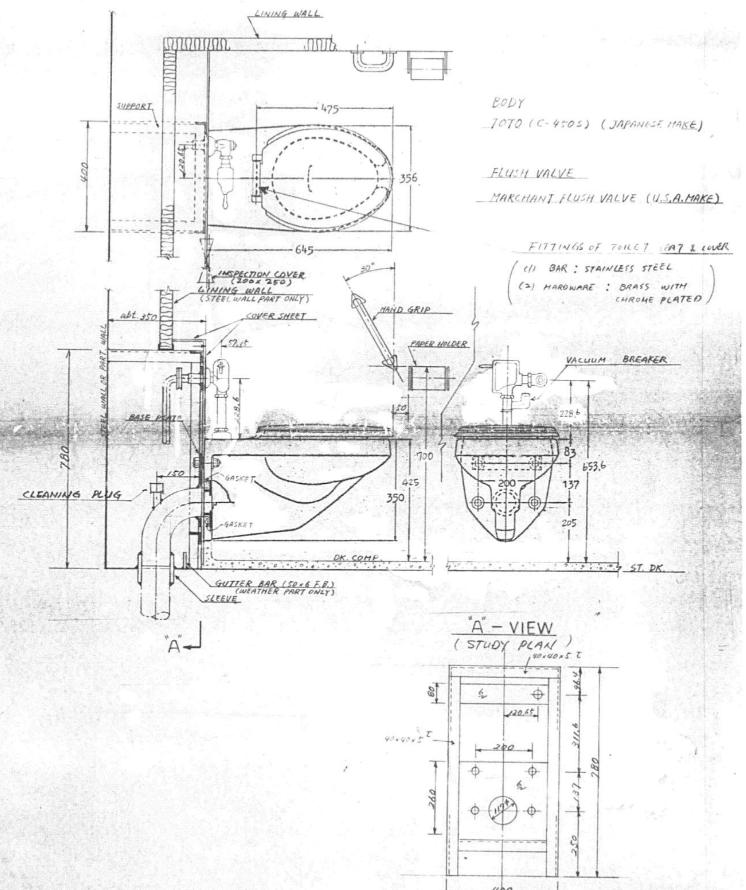




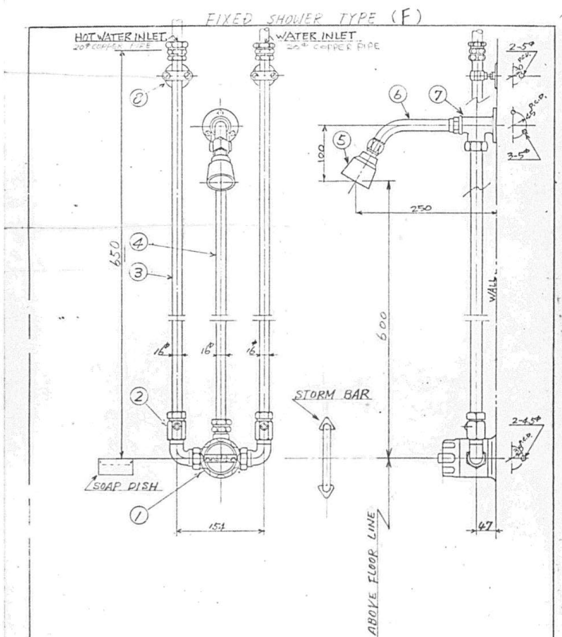


洋風大便器 (E)

WATER CLOSET (WALL MOUNTED TYPE)

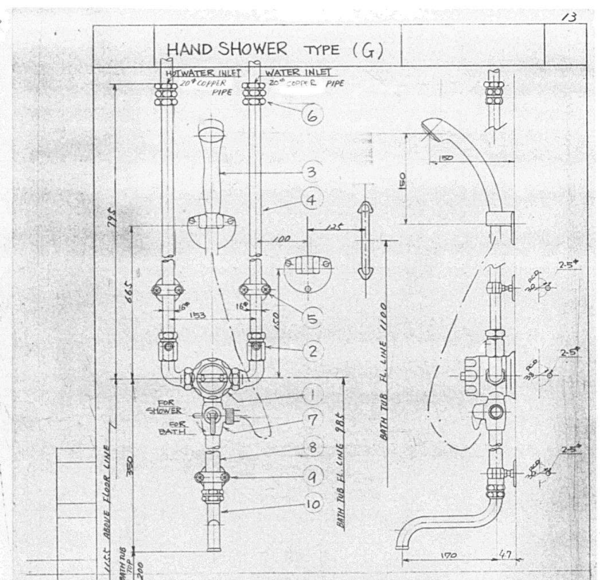


1323



MARK	PARTICULARS	Q	MATERIAL	REMARKS
8	PIPE SUPPORT	2	Bs	CHROME PLATED
7	BACK PLATED ELBOW	1	Bs	
6	SHOWER ARM	1	Bs	
5	SWIVEL SHOWER HEAD	1	PLASTIC	
4	PIPE	1	Bs	16φ CHROME PLATED
3	PIPE	2	CuP	16φ
2	BALL VALVES RING JOINT	2	Bs	
1	"RADA" MIXING VALVE	1	BC PLASTIC	TYPE B

"RADA" MIXING VALVE
SHOWER ASSEMBLY TYPE er
1990.4.10. S: 1/5 DW. H.OHTA NO.S-16



MARKS	DESCRIPTION	Q.T.Y.	MATERIAL	
1	MIXING VALVE	1	BC	rada8 CHROME PLATED
2	BALL VALVE	2	Bs	
3	HAND SHOWER	1	RUBBER, Bs, PLASTIC	ℓ=1500
4	PIPE	2	DCuP	
5	PIPE HOLDER	2	Bs	
6	SOCKET	2	Bs	
7	THREE WAY COCK	1	Bs	
8	PIPE	1	Bs	½ P.T.
9	PIPE HOLDER	2	Bs	
10	SPOUT	1	CuP. Bs	19φ

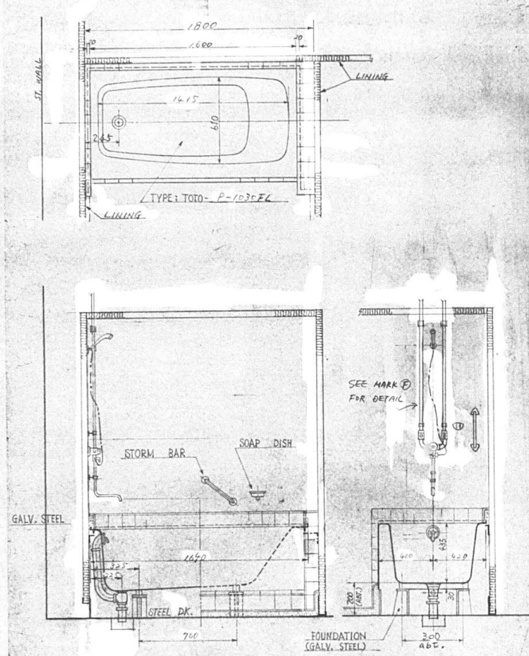
S: 1/5 NO. 80102

1324

14

BATH TUB (F.R.P.) (H)

LOCATION: HOSPITAL BATH

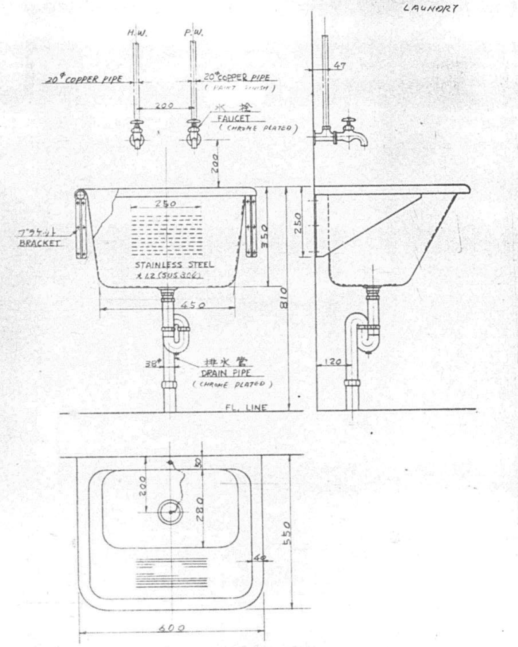


三井造船技術標準 15

洗濯槽 (I) WASH TUB

MES SD44330

LOCATION: LAUNDRY

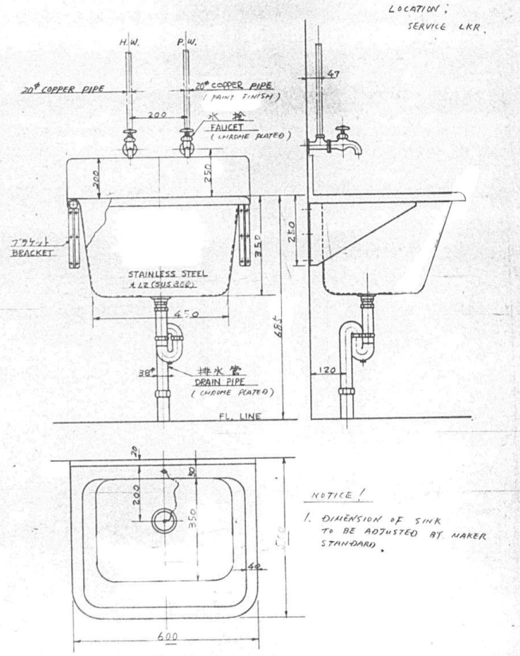


三井造船技術標準 16

洗し (J) SINK

MES SD

LOCATION: SERVICE LKR.

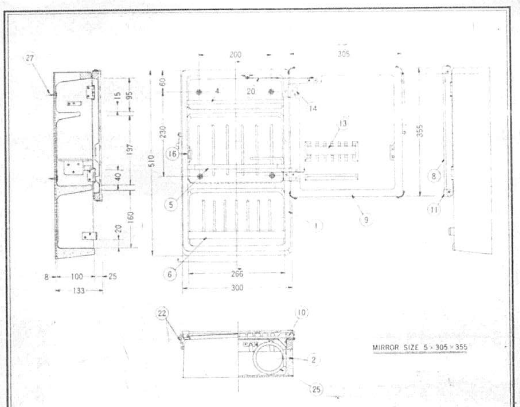


NOTICE!

1. DIMENSION OF SINK TO BE ADJUSTED AT MAKER STANDARD.

WALLCABINET FOR MARINE TW-S 351

17



REVISION

NO	1	2	3	4
DATE	OCT.1.1966.			

ITEM NO.	NAME	MATL-DESCR	QTY	REMARKS	ITEM NO.	NAME	MATL-DESCR	QTY	REMARKS
1	CABINET	PLASTIC (ABS)	1		27	FIXING SCREW	BRASS	4	
2	REINFORCEMENT FOR CABINET	PLASTIC FOAM	1						
4	GUARD	ALUMINUM	1						
5	〃	〃	1						
6	〃	〃	1						
8	MIRROR		1	DAMP PROOF					
9	DOOR BACK	PLASTIC (ABS)	1						
10	REINFORCEMENT FOR DOOR BACK	WOOD	1						
11	MIRROR HOLDER	BRASS	4						
13	TOOTH BRUSH HOLDER	PLASTIC (ABS)	1						
14	HINGE	STAINLESS STEEL	2						
16	MAGNET CATCH		1						
20	DOOR STAY	BRASS	1						
22	LATCH	STAINLESS STEEL	1						
25	GLASS HOLDER	PLASTIC (PMMA)	1						

S.45. 3. 5.

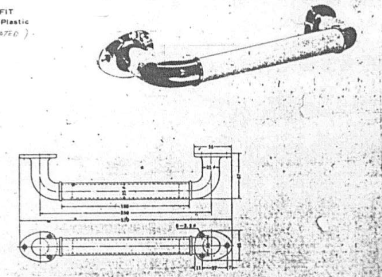
TOYO PLASTIC CO., LTD. TOKYO OSAKA JAPAN

1325

Toilet Accessories And Curtain Hardwares 18

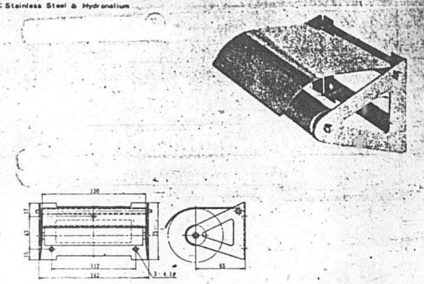
OHS 7031	HAND GRIP	ハンドグリップ

用途：船の動揺に対し安定を保つ為の手掛として使用する
USE：SANITARY OUTFIT
MATERIAL：Brass & Plastic (CHROME PLATED)



OHS 7041	PAPER HOLDER WITH COVER	カバー付 紙巻器

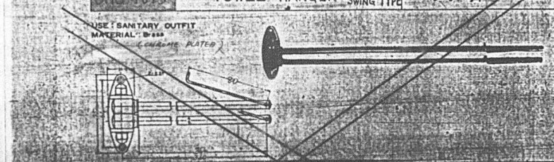
MATERIAL：Stainless Steel & Hydronalium



19 *Toilet Accessories And Curtain Hardwares*

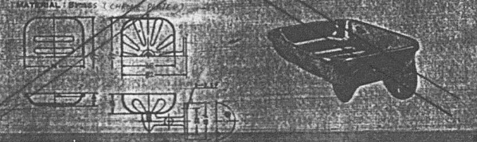
OHS 7015	TOWEL HANGER SWING TYPE	タオル掛 スイング

USE：SANITARY OUTFIT
MATERIAL：Brass (CHROME PLATED)



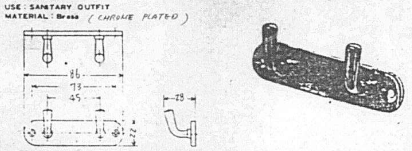
OHS 7111	SOAP DISH "A" TYPE	石けん受 A型

MATERIAL：Brass (CHROME PLATED)



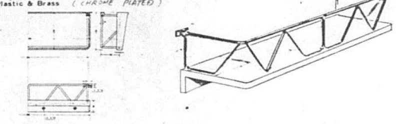
OHS 7001	TOWEL HOOK	タオル フック

USE：SANITARY OUTFIT
MATERIAL：Brass (CHROME PLATED)



OHS 7143	TOILET RACK "C" TYPE	化粧棚 C型

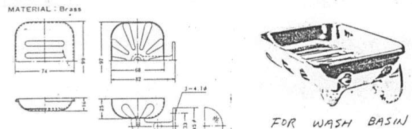
用途：南室等に取付け化粧棚として使用する
USE：SANITARY OUTFIT
MATERIAL：Plastic & Brass (CHROME PLATED)



20

OHS 7111	SOAP DISH "A" TYPE	石けん受 A型

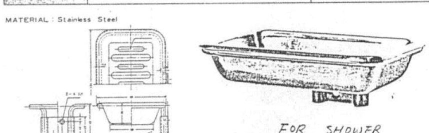
MATERIAL：Brass



FOR WASH BASIN

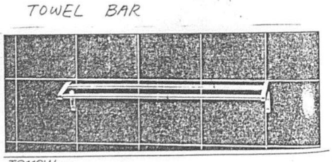
OHS 7112	SOAP DISH "B" TYPE	石けん受 B型

MATERIAL：Stainless Steel



FOR SHOWER

TOWEL BAR



TS113W 610mm

FOR WASH BASIN

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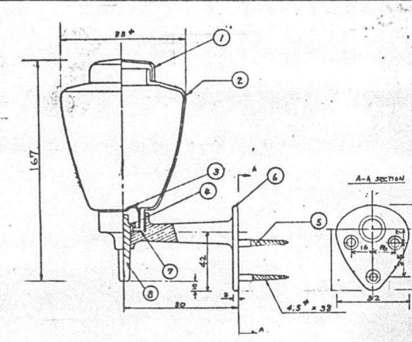
PLUMBING FIXTURE	
LIQUID SOAP DISPENSER	SCALE 1/2



TS 126 SN or EQUIVALENT (TOTO)

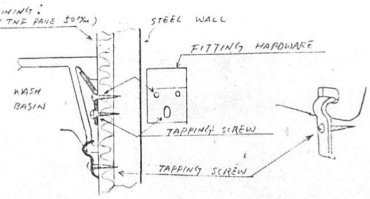
FOR GALLEY ONLY

PART No	NAME	REQ No	MAT'L	REMARK	WT	製作
1	COVER	1	HIGH-DENSITY POLYETHYLENE	WHITE		
2	SOAP VESSEL	1	"	"		
3	SPRING CUP	1	BRASS			
4	SPRING	1	PHOSPHOR BRONZE			
5	WOOD SCREW	3	BRASS	CHROME PLATED 4.5φ × 38		
6	FLANGE	1	"	CHROME PLATED		
7	WASHER	1	"			
8	VALVE	1	"	CHROME PLATED		

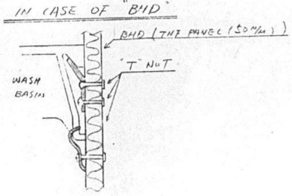
1326

METHOD OF FIXING FOR WASH BASIN

IN CASE OF LINING



IN CASE OF "BHD"



APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	3 OCT. 1985	OFTS/MES -083	22, NOV, 85	T-8-2		

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

OUTFIT DESIGN SECT

DIAGRAM OF CONTROL AIR PIPING FOR STOPPER OF GARBAGE HOPPER
ガーベジーホッパー ストッパー用 操作空気管系統図

DATE (TEL2236)

JOB NO. TS1323/24/25 — JOBCLASSIF. NO. D.17.04 — SCALE ~ — LYKES REF. NO. 360402 — MITSUI DRAWING NO. 4116507 — REV.

(9 SHEETS WITH COVER) (1/9)

A4- A3- A2- B2- B1-

2/9

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5 OCT 1986	PREPARED FOR S.NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO. 1324 AND S.NO. 1325	S. Nishiguchi

REFERENCE

NO.	REF. NO. MES	REF. NO. LIKES	DWG. NO.	DWG. NAME
1		480001	4116002	PIPING PRACTICE
2		190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
3		482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
4		482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
5		482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS.
6		482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER & COPPER NICKEL PIPES.
7		482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
8		482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
9		482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
10		482608	5131205	GASKET (GENERAL USE)
11		482407	5233114	BRONZE VALVES
12		481801	4117401	DIAGRAM OF COMPRESSED AIR LINES
13		360401	4A16959	ARR. FOR GARBAGE ROOM
14		360403	4116420	MOTOR DRIVE VALVE & AIR CYLINDER
15				
16				
17				
18				
19				
20				

DWG. NO. 4116507 3/9

PIPING LIST (1/1)

銅管 ---- 4216521
フレアージョイント ---- 4216532
貫通用継手 ---- 4216443

SYSTEM (SERVICE)		MAX. WORK. PRESS (kg/cm²)	WORK. TEMP. (°C)	HYD. TEST PRESS (kg/cm²)	PIPE MATERIAL	LIST NO. STANDARD	LIST NO. ASST. END	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	JOINT PRESS STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
CONTROL AIR PIPES FOR STOPPER OF GARBAGE HOPPER	COMPRESSED AIR	9.9	55	9.9	SEAMLESS COPPER PIPE C1220T-O JIS H 3300 (EQUIV TO ASTM B88 C12200)	CA-571-580	571	6	1/4	8.0	1.2	—	10K	FLARE JOINT	NAVAL BRASS JIS H 3250 C4641B (EQUIV. TO ASTM B21 UNS C46400) OR BRASS JIS H 3250 C3604 (EQUIV. TO ASTM B16 UNS C36000)	II	II
		5		5		CA-581-590	582	4	1/8	6.0	1.0	—					

DWG. NO. 4116507 4/9

1328

FITTING LIST (1/1)

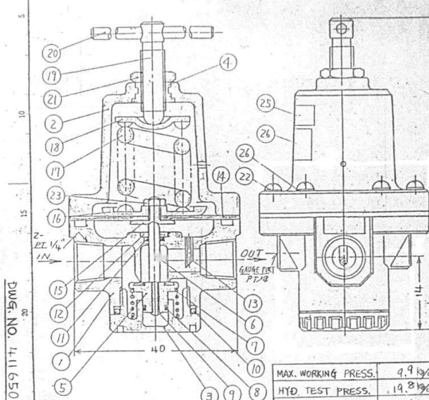
SYMBOL	NAME	SERVICE	PRESS. RATE (kg/cm²)	MAX. WORK. PRESS. (kgf/cm²)	WORK. TEMP. (°C)	MATERIAL			NOM. DIA.		QTY.	LIST NO.	REMARKS
						BODY	STEM	DISK	MM	INCH			
	GLOBE VALVE (FLARE TYPE)	COMP. AIR	20	9.9	55	CAST BRONZE BC6 JISH5111 (EQUIV. TO ASTM. B62)	STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	CAST BRONZE BC 6 JIS H5111 (EQUIV. TO ASTM B62)	6	1/4	1	CAV-571	SEE REF. NO. 11 5/4 4216526
5K ← 9.9K	REGULATOR	COMP. AIR	9.9	9.9	55	ALUMINIUME ALLOY DIE CASTING ADC 12 JISH5302 (EQUIV. TO ASTM B85)	FREE CUTTING BRASS ROD & BAR C3604 JIS H 3250 (EQUIV. TO ASTM B16 C3600)		6	1/4	1	CAV-572	SEE PAGE 7/10 5/4 4216527

DWG. NO 4116507

5/9

ZM283

DWG. NO. 4116507



ITEM	PART NO	PART NAME	MATERIAL	Q'TY	EQUIV. ASTM NAME
26		SPRING WASHER	STEEL WIRE ROD	6	
25	135023	NAME PLATE	MYLAR FILM	1	
24	13526	NAME PLATE	MYLAR FILM	1	
23		DIAPHRAGM SET NUT	FREE CUTTING BRASS ROD AND BAR	1	
22		BON NET SCREW	MILD STEEL WIRE ROD	6	
21	13058	LOCK NUT	ROLLED STEEL FOR GENERAL STRUCTURE	1	
20	130525	HANDLE	CARBON STEEL FOR MACHINE STRUCTURAL USE	1	
19	130524	SCREW	CARBON STEEL FOR MACHINE STRUCTURAL USE	1	
18	13057	SPRING HOLDER	CARBON STEEL PLATE	1	
17	13056	ADJUST SPRING	PIANO WIRES	1	A 230
16	13059	DIAPHRAGM SHELL	ALUMINIUM DIE CASTING	1	
15	130510	DIAPHRAGM HOLDER	FREE CUTTING BRASS ROD AND BAR	1	C 36000
14	13055	DIAPHRAGM	ACRYLONITRILE RUBBER	1	
13	130515	STATIC PRESSURE TUBE	COPPER TUBE	1	
12	130479	"O" RING HOLDER	ALUMINIUM SHEET	1	
11		"O" RING	ACRYLONITRILE RUBEER	1	
10		"O" RING	ACRYLONITRILE RUBEER	1	
9		RETAINING RING	SPRING STEEL	1	
8		"O" RING	ACRYLONITRILE RUBEER	1	
7	135211	VALVE SPRING	STAINLESS STEEL	1	A 276 304
6	13525	VALVE ROD	FREE CUTTING BRASS ROD AND BAR	1	C 36000
5	13524	VALVE	FREE CUTTING BRASS ROD AND BAR	1	C 36000
4	13534	BUSHING	FREE CUTTING BRASS ROD AND BAR	1	C 36000
3	13523	VALVE GUIDE	ALUMINIUME ALLOY DIE CASTING	1	B 85
2	13521	BONNET	ALUMINIUME ALLOY DIE CASTING	1	B 85
1	13522	BODY	ALUMINIUME ALLOY DIE CASTING	1	B 85

TITLE : REGULATOR

SMC SHOKETSU KINZOKU KOGYO CO., LTD.

MAX. WORKING PRESS.	9.9 kg/cm²
HYD. TEST PRESS.	19.8 kg/cm²
BURST TEST PRESS.	39.6 kg/cm²
WORK. TEMP.	55°C

DRAWN BY	
DATE	
DESIGN'D BY	Y. Takeo
DATE	9.28.72
CHECK'D BY	
DATE	
APPR'D BY	T. Shimizu
DATE	9.28.72

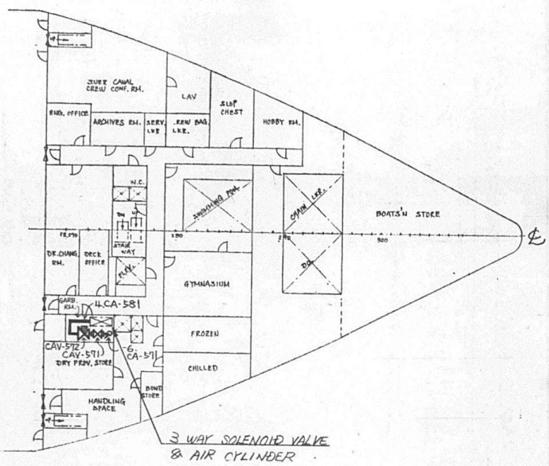
SCALE 1/1

THIRD ANGLE P.

DWG. NO. Ⓐ AR600

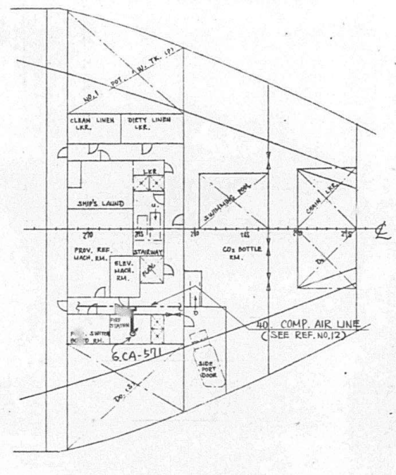
1330

UPPER DK. PLAN
(SCALE OF OUTLINE : 1/200)



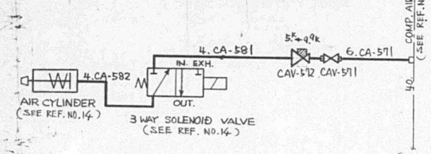
DWG. NO. 4116507 7/9

2ND DK. PLAN
(SCALE OF OUTLINE : 1/200)

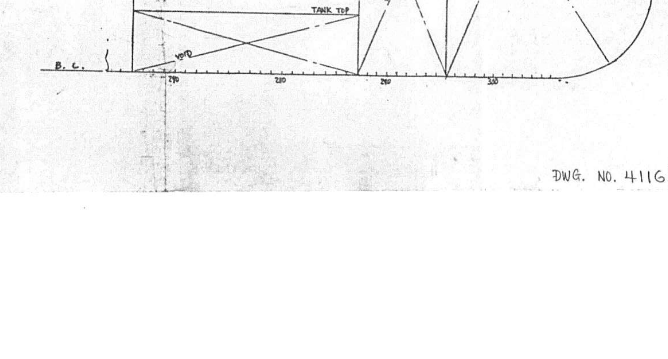


DWG. NO. 4116507 8/9

SCHEMATIC DIAG. OF CONTROL AIR PIPING
FOR STOPPER OF GARBAGE HOPPER



PROFILE
(SCALE OF OUTLINE : 1/200)



DWG. NO. 4116507 9/9

1331

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	JUL.4.'84	OFTS/MES-665			AUG.26.'85	T-8-2		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC. (PIPING)

船倉通風管配置(含諸倉庫)
ARRANGEMENT OF HOLD VENTILATOR (INCL. STORE SPACE)

(TEL 2240)

JOB NO. TS1323/24/25 — SCALE ~ — LYKES REF. NO. 380002 — MITSUI DRAWING NO. 4106101

(28 SHEETS WITH COVER)

1/28

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN. MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG. NO. 4106101. 2/28

GENERAL NOTE

1. REFER TO THE FOLLOWING DISCUSSION MEMORANDUM.
   - A) OCT. '84 MEETING : ITEM 32
   - B) NOV. '84 MEETING : ITEM 1
   - C) OWNER'S TLX.: REF. NO. 1027 ITEM 1 DATED OF 10 DEC. '84
   - D) APRIL '85 MEETING: "GENERAL AND HULL OUTFITTING EXCEPT ACCOMMODATION" ITEM 39.
2. SIX (6) SETS OF EXHAUST FANS SHALL BE OF CFE.
3. RATE OF AIR CHANGES SHALL BE OF 3 TIMES/HR.

DWG. NO. 4106101 3/28

REFERENCE DRAWING

NO.	REV. NO.	DWG. NO.	DWG. NAME
1		4100030⅓	PIPING ARRANGEMENT ON BHD (TK204)
2		4100030⅔	DO. (TK103)

DWG. NO. 4106101 4/28

1332

NOTE.

A. FAN CAPACITY

REQUIRED CAPACITY OF ADDITIONAL EXH'T FANS SHALL BE DICIDED AS FOLLOWS.

CALCULATION FORMULA :

$$Q = \frac{V \times T \times C}{60 \times N} \quad (M^3/MIN)$$

WHERE,

V: VOLUME OF CONTAINER HOLD (M^3)

(NO.2 CONTAINER HOLD : 13,240 M^3
NO.3 DO. : 14,250 M^3
NO.4 DO. : 14,990 M^3)

T: RATE OF AIR CHANGE : 2 TIMES/HR

N: NUMBER OF FAN PER EACH CONTAINER HOLD (2 SETS PER EACH HOLD)

C: MARGIN : 10 %

BY THE WAY,

REQUIRED CAPACITY OF EXHAUST FAN

FOR NO.2 HOLD

$13,240^{(M^3)} \times 2^{(TIMES/HR)} \times 1.1 / \times 60 \times 2^{(SETS)} = 242 \ (M^3/MIN)$

FOR NO.3 HOLD

$14,250^{(M^3)} \times 2^{(TIMES/HR)} \times 1.1 / \times 60 \times 2^{(SETS)} = 261 \ (M^3/MIN)$

FOR NO.4 HOLD

$14,990^{(M^3)} \times 2^{(TIMES/HR)} \times 1.1 / \times 60 \times 2^{(SETS)} = 275 \ (M^3/MIN)$

THEREFORE,

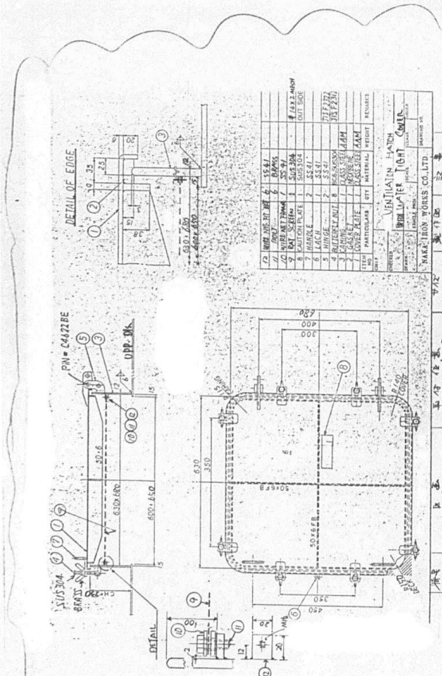
CAPACITY OF ALL FANS SHALL BE OF 275 M^3/MIN BY RESULT OF ABOVE CALCULATION.

B. TYPE OF FAN AND MOTOR

- FAN: MARINE DUTY DUCT AXIAL FAN.
- MOTOR: CLASS 1, GROUP D, DIVISION 1, EXPLOSION PROOF TYPE.

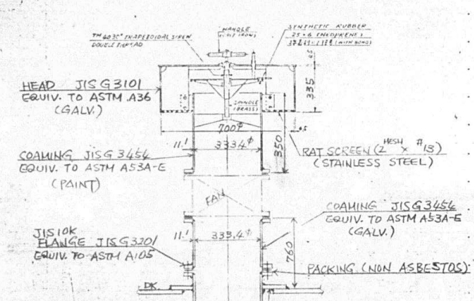
FAN PARTICULAR

NAME	TYPE	AIR VOLUME M³/MIN	STATIC PRESSURE MMAQ	MOTOR OUT PUT KW	REVOLUTION R.P.M. DESIGNED	REVOLUTION R.P.M. MEASURED	VOLT. DESIGNED	VOLT. MEASURED	AMP. DESIGNED	AMP. MEASURED
NO.23 EXH'T FAN FOR NO.2 HOLD	AXIAL FLOW FAN.	275	44	3.7	1,800		AC 440V 3φ, 60Hz			
NO.24 "										
NO.25 " FOR NO.3 HOLD										
NO.26 "										
NO.27 " FOR NO.4 HOLD										
NO.28 "										



符号 MARK	区画 SPACE	取付位置 FITTING POSITION	サイズ SIZE	製作図 MANUFACTURE DWG	記事 REMARKS
CV-1	NO.2 HOLD	ON UPP. DK (Fr 214, P)	600x650		
CV-2	"	" (" , P)	"		
CV-3	NO 3 HOLD	" (Fr 178, S)	"		
CV-4	"	" (" , P)	"		
CV-5	NO.4 HOLD	" (Fr 142, S)	"		
CV-6	"	" (" , P)	"		

350φ MUSHROOM VENTILATOR



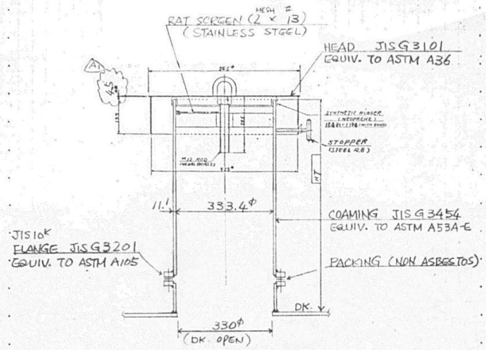
LIST OF VENTILATOR

符号 MARK	区画 SPACE	取付位置 FITTING POSITION	コーミング高さ COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
MV1	DUCT KEEL	UPP. DK.	760	4106102	ONE SET
MV2	DO.	DO.	760		DO.

1333

350$^\phi$ MUSHROOM VENTILATOR

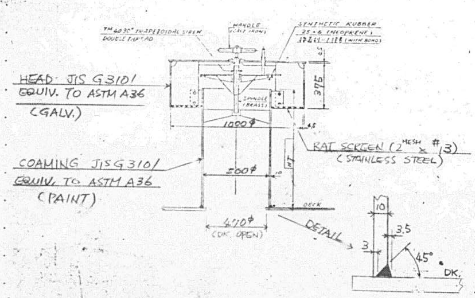
(GALVANIZED)



LIST OF VENTILATOR

符号 MARK	区画 SPACE	取付位置 FITTING POSITION	コーミング高さ COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
MV3	DUCT KEEL	UPP. DK.	760	4106102	ONE SET
MV4	DO.	DO.	760		DO.

500$^\phi$ MUSHROOM VENTILATOR

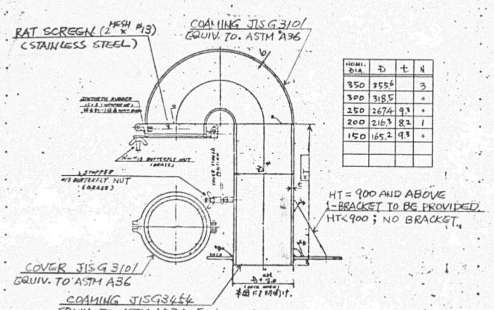


LIST OF VENTILATOR

符号 MARK	区画 SPACE	取付位置 FITTING POSITION	コーミング高さ COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
MV5	STEERING GEAR RM.	UPP. DK.	760	4106102	ONE SET
MV6	DO.	DO.	760		DO.

GOOSENECK VENTILATOR

(GALVANIZED)



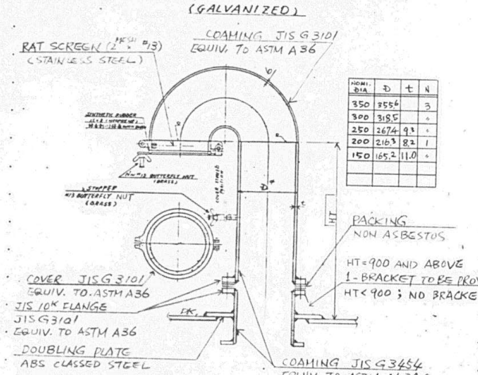
NOMI. DIA	D	t	N
350	355.6		3
300	318.5		4
250	267.4	9.3	4
200	216.3	8.2	1
150	165.2	9.3	4

LIST OF VENTILATOR

符号 MARK	呼径 NOMI. DIA	区画 SPACE	取付位置 FITTING POSITION	コーミング高さ COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
GV1	250	BOATSN'S STORE	FOCSLE DK.	760	4106102	ONE SET
GV2	250	DO.	DO.	760		DO.
GV3	250	DO.	DO.	760		DO.
GV4	250	DO.	DO.	760		DO.

GOOSENECK VENTILATOR

(GALVANIZED)



NOMI. DIA	D	t	N
350	355.6		3
300	318.5		4
250	267.4	9.3	4
200	216.3	8.2	1
150	165.2	11.0	4

LIST OF VENTILATOR

符号 MARK	呼径 NOMI. DIA	区画 SPACE	取付位置 FITTING POSITION	コーミング高さ COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
GV5	200	UNDER DK. PASSAGE	UPP. DK.	760	4106102	ONE SET
GV6	200	DO.	DO.	760		DO.
GV7	150	DO.	DO.	900		DO.
GV8	150	DO.	DO.	900		DO.
GV9	150	DO.	DO.	760		DO.
GV10	150	DO.	DO.	760		DO.
GV11	150	DO.	DO.	760		DO.
GV12	150	DO.	DO.	760		DO.
GV13	150	DO.	DO.	760		DO.
GV14	150	DO.	DO.	760		DO.

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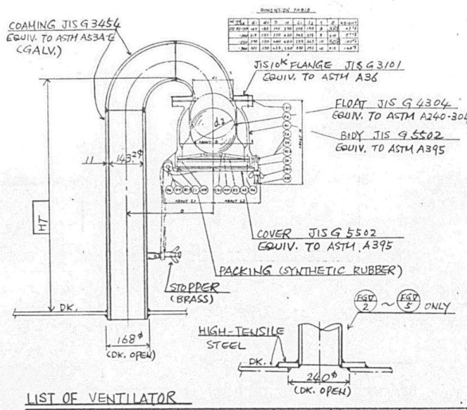
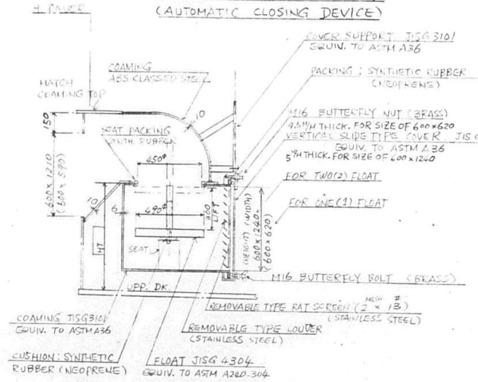
GOOSENECK VENTILATOR WITH FLOAT



LIST OF VENTILATOR

符号 MARK	区画 SPACE	取付位置 FITTING POSITION	(HT) コーミング高さ COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
FGV1	BOATSN'S STORE	FOCSLE DK.	760	4106102	TWO SETS
FGV2	UNDER DK. PASSAGE	UPP. DK.	760		ONE SET
FGV3	Do.	Do.	760	HEAD:	Do.
FGV4	Do.	Do.	760	ⓕ4206111	TWO SETS
FGV5	Do.	Do.	760		Do.
FGV6	STEERING GEAR RM.	Do.	760		ONE SET
FGV7	Do.	Do.	760		Do.

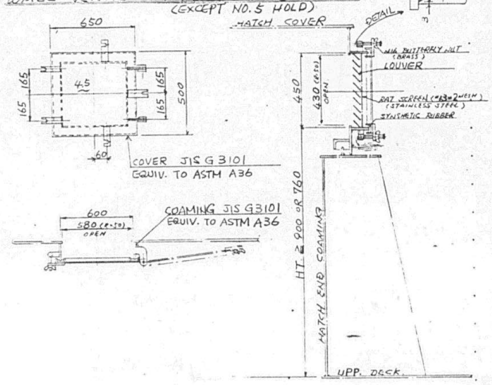
FLOAT TYPE VENTILATOR
(AUTOMATIC CLOSING DEVICE)



LIST OF VENTILATOR

符号 MARK	区画 SPACE	取付位置 FITTING POSITION	(HT) コーミング高さ COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
FV1	NO.5 HOLD	HATCH SIDE COAMING	760	4106103	TWO FLOAT 16 SETS
FV2	Do.	Do.	760		TWO FLOAT 2 SETS
FV3	Do	Do.	760	FLOAT:	Do. Do.
FV4	Do	Do.	760	ⓕ4206111	ONE FLOAT 4 SETS

600×450 WALL VENTILATOR FOR CARGO HOLD
(EXCEPT NO.5 HOLD)

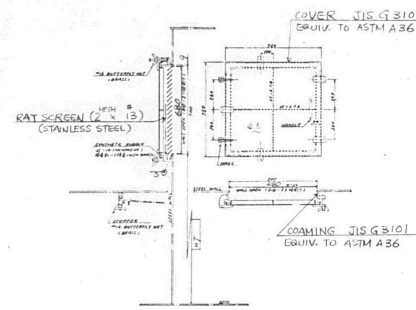


LIST OF VENTILATOR

符号 MARK	区画 SPACE	取付位置 FITTING POSITION	コーミング高さ COAMING HEIGHT (H)	製作図 MANUFACTURE DRAWING	記事 NOTE
WV1	NO.1～4 HOLD NO.6 HOLD	CARGO HATCH COVER	MIN 760 or 900	4106104	16 SETS

700×700 WALL VENTILATOR

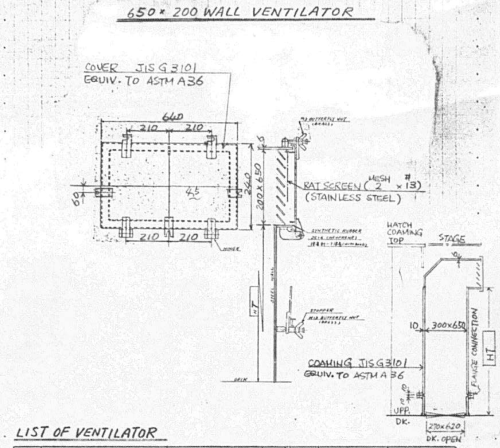
LEFT HINGE



LIST OF VENTILATOR

符号 MARK	区画 SPACE	取付位置 FITTING POSITION	(H) コーミング高さ COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
WV2	STEERING GEAR RM.	COMPANION	760	4106102	ONE SET

650×200 WALL VENTILATOR



LIST OF VENTILATOR

符号 MARK	区画 SPACE	取付位置 FITTING POSITION	コーミング高さ (H) COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
WV3	UNDER DK. PASSAGE	UPP. DK.	900	4106102	TWO SETS
WV4	DO.	DO.	900		DO.

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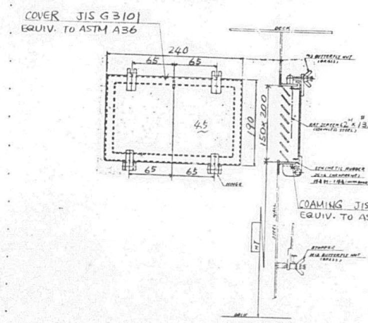
200×150 WALL VENTILATOR

(GALVANIZED)



LIST OF VENTILATOR

符号 MARK	区画 SPACE	取付位置 FITTING POSITION	コーミング高さ (H) COAMING HEIGHT	製作図 MANUFACTURE DRAWING	記事 NOTE
WV7	PAINT RM.	PAINT RM. WALL	ABT. 1850	4106102	TWO SETS
WV8	CO_2 BOTTLE RECESS FOR PAINT RM.	CO_2 BOTTLE RECESS	ABT. 2150		ONE SET

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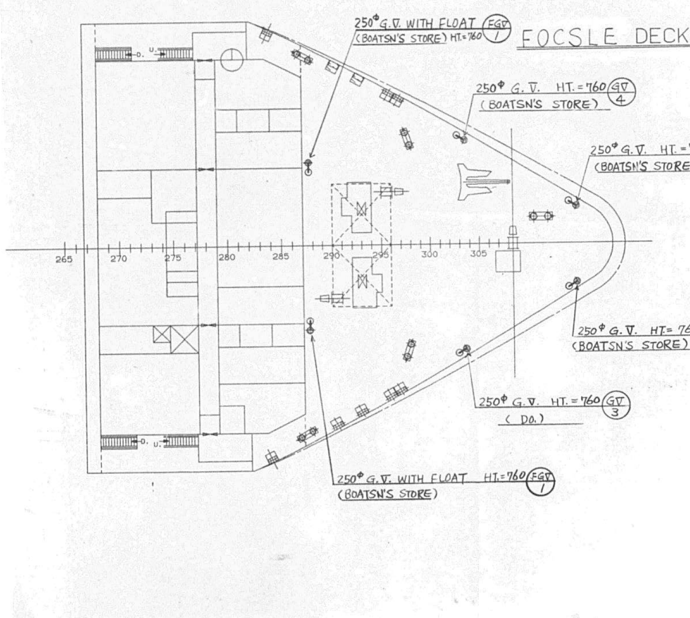
FOCSLE DECK



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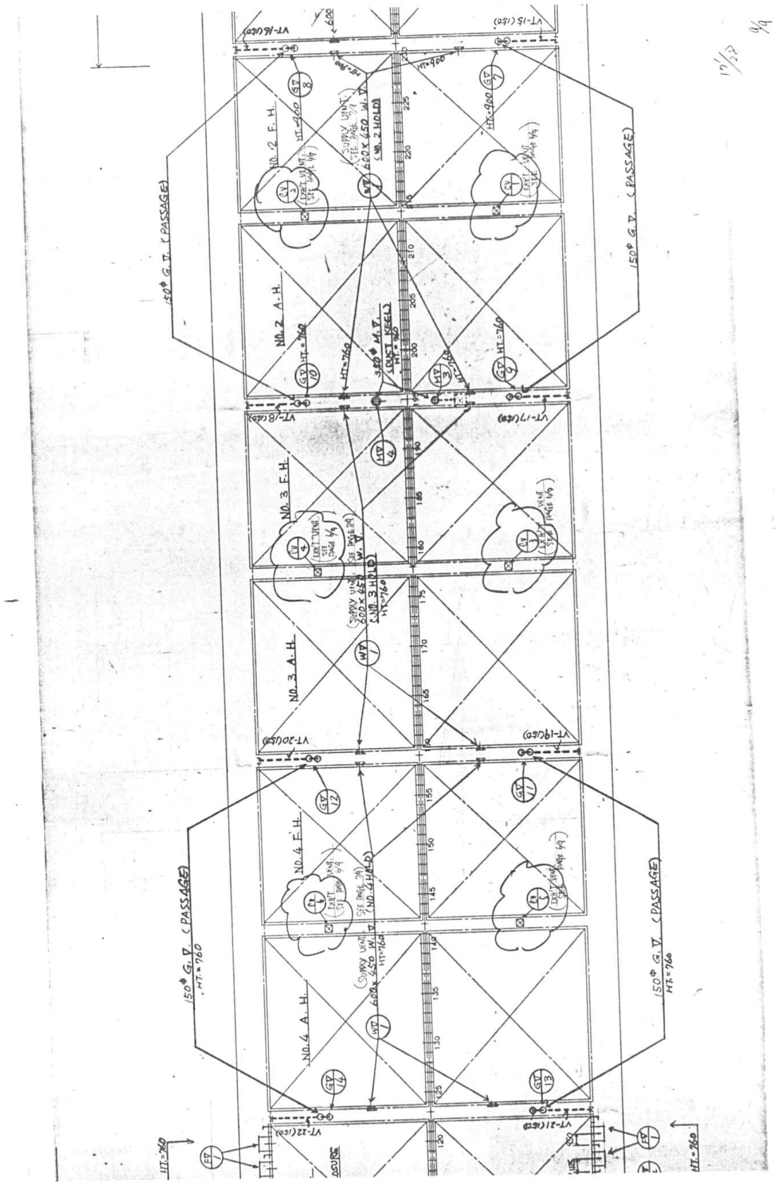
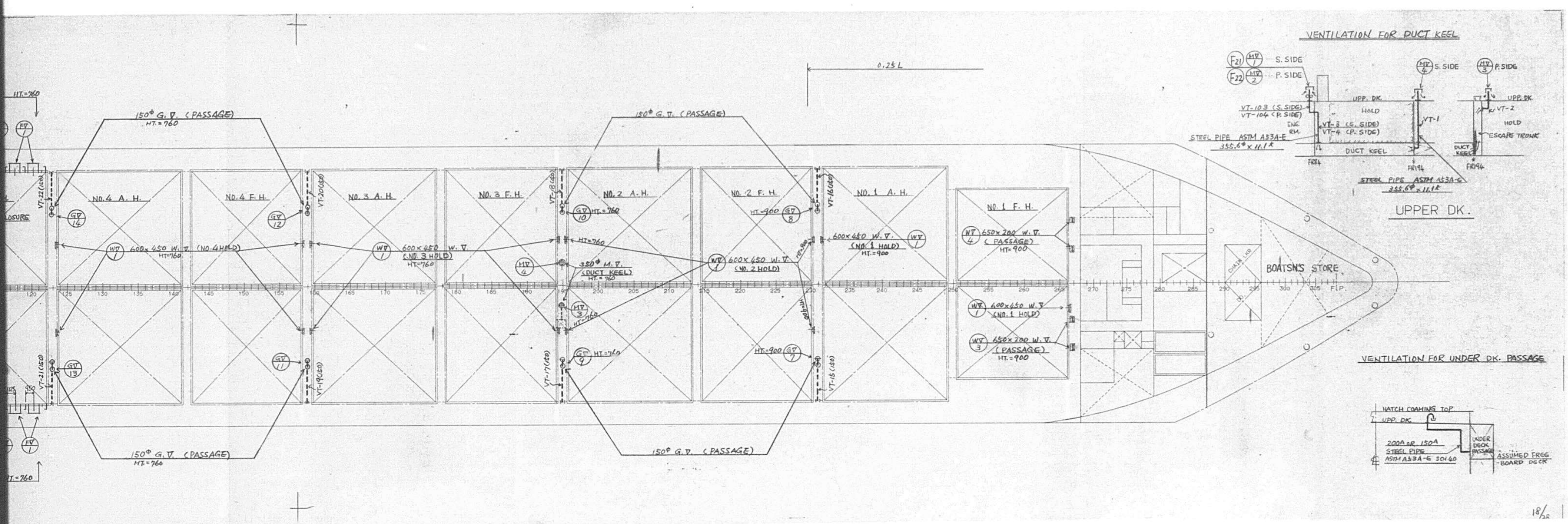
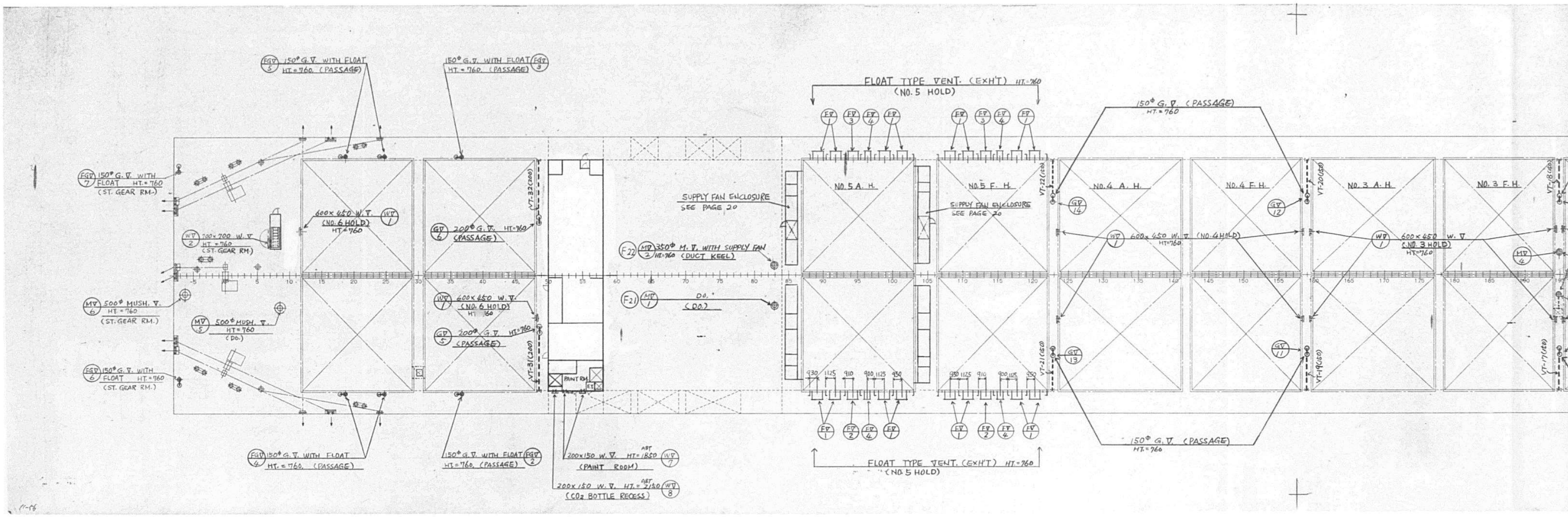


1337



VENTILATION FOR DUCT KEEL
UPPER DK.
VENTILATION FOR UNDER DK. PASSAGE
BOATSN'S STORE
NO.4 A.H.
NO.4 F.H.
NO.3 A.H.
NO.3 F.H.
NO.2 A.H.
NO.2 F.H.
NO.1 A.H.
NO.1 F.H.
150φ G.V. (PASSAGE)
0.25L

1338

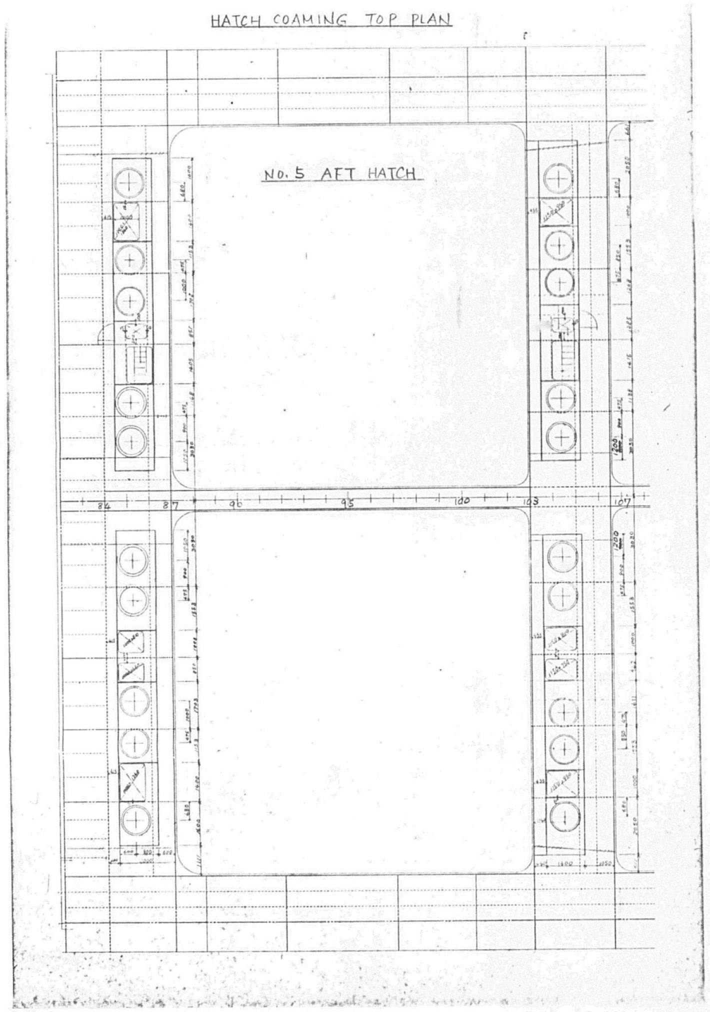


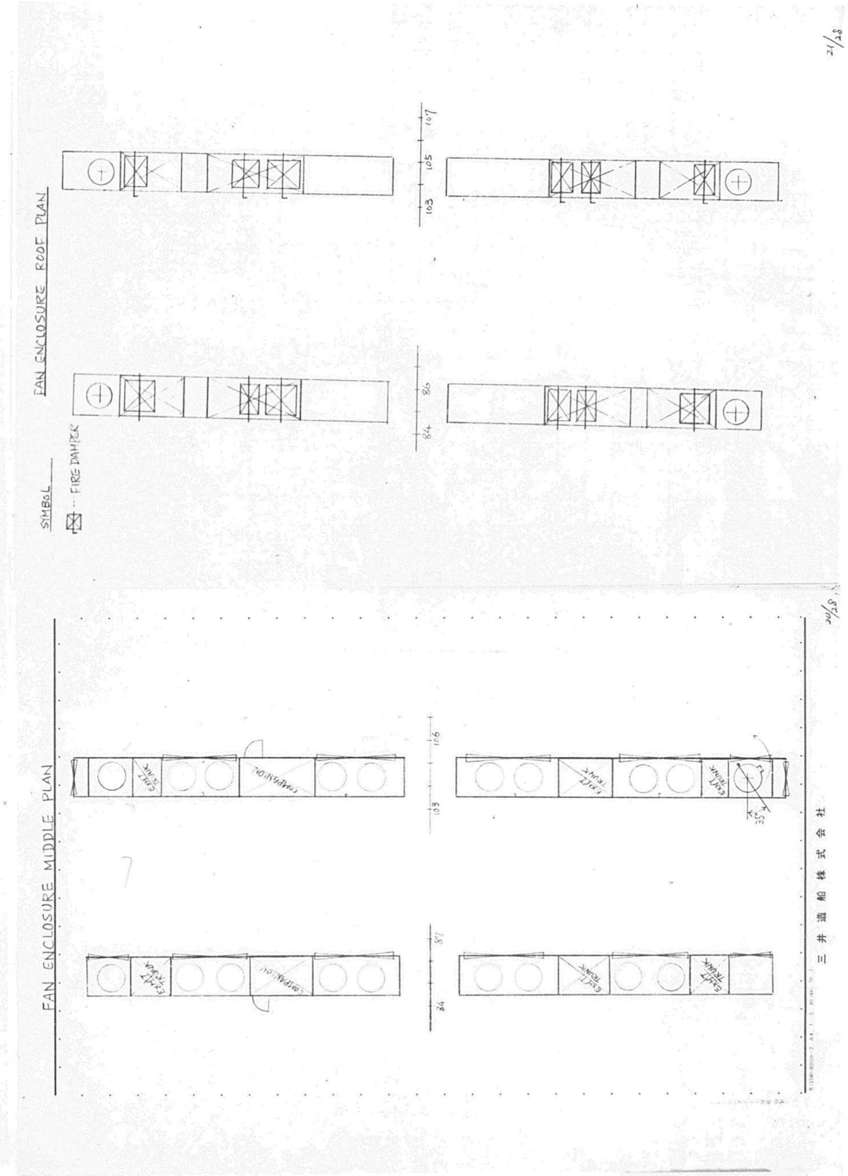
150φ G.V. WITH FLOAT HT = 760. (PASSAGE)
150φ G.V. WITH FLOAT HT = 760 (ST. GEAR RM.)
600×450 W.T. (NO. 6 HOLD) HT = 760
200φ G.V. HT = 760 (PASSAGE)
200×200 W.V. HT = 760 (ST. GEAR RM.)
500φ MUSH. V. HT = 760 (ST. GEAR RM.)
500φ MUSH. V. HT = 760 (DO.)
600×450 W.V. (NO. 6 HOLD)
SUPPLY FAN ENCLOSURE SEE PAGE 20
350φ M.V. WITH SUPPLY FAN (DUCT KEEL)
FLOAT TYPE VENT. (EXH'T) HT = 760 (NO. 5 HOLD)
150φ G.V. (PASSAGE) HT = 760
NO. 5 A. H.
NO. 5 F. H.
NO. 4 A. H.
NO. 4 F. H.
NO. 3 A. H.
NO. 3 F. H.
600×450 W.V. (NO. 4 HOLD)
600×450 W.V. (NO. 3 HOLD) HT = 760
200×150 W.V. HT = 1850 (PAINT ROOM)
200×150 W.V. HT = 2150 (CO2 BOTTLE RECESS)
PAINT RM.

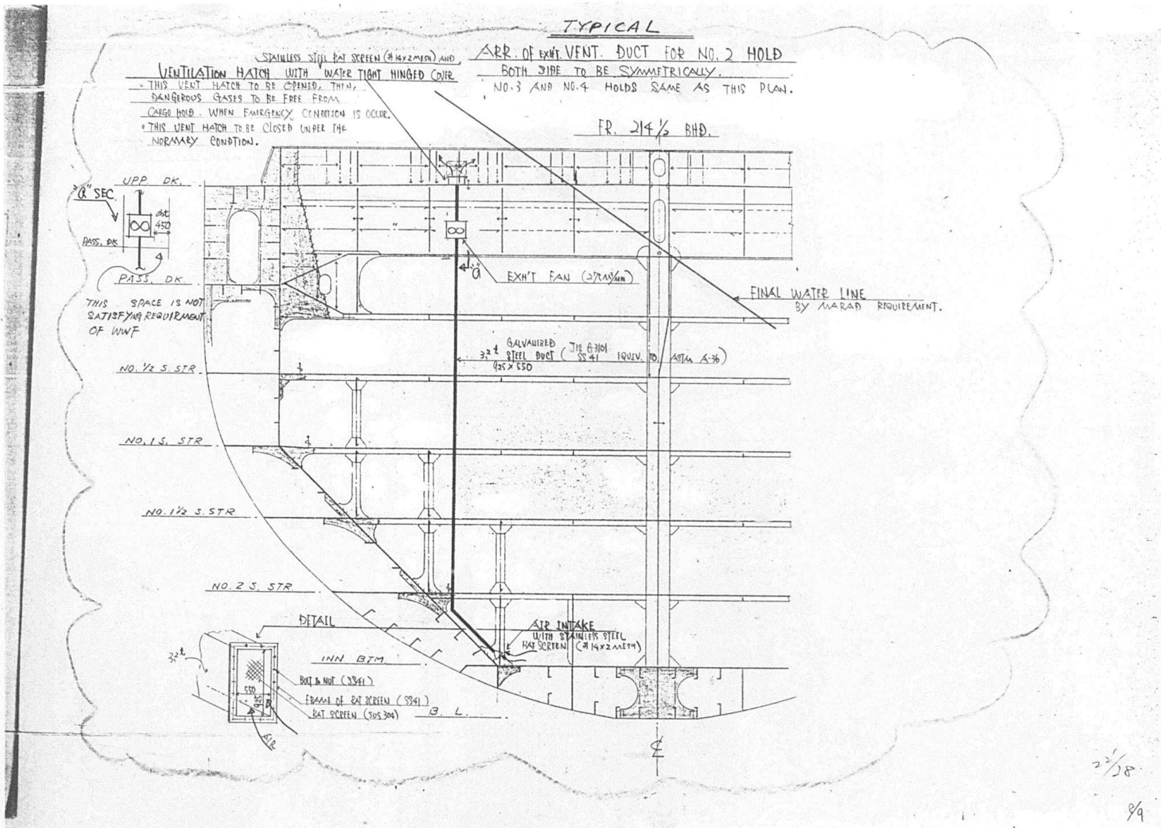
2/2

1339

HATCH COAMING TOP PLAN







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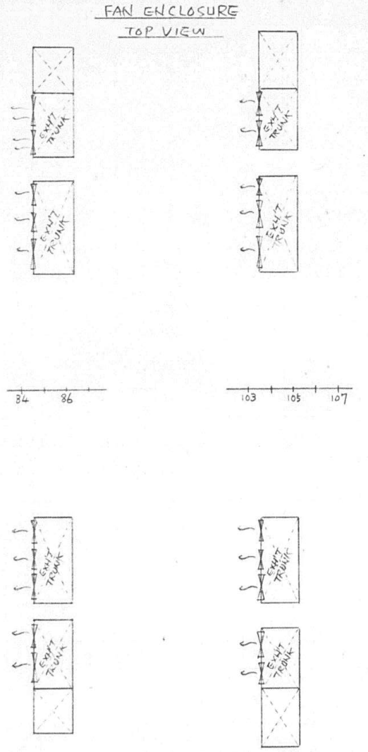

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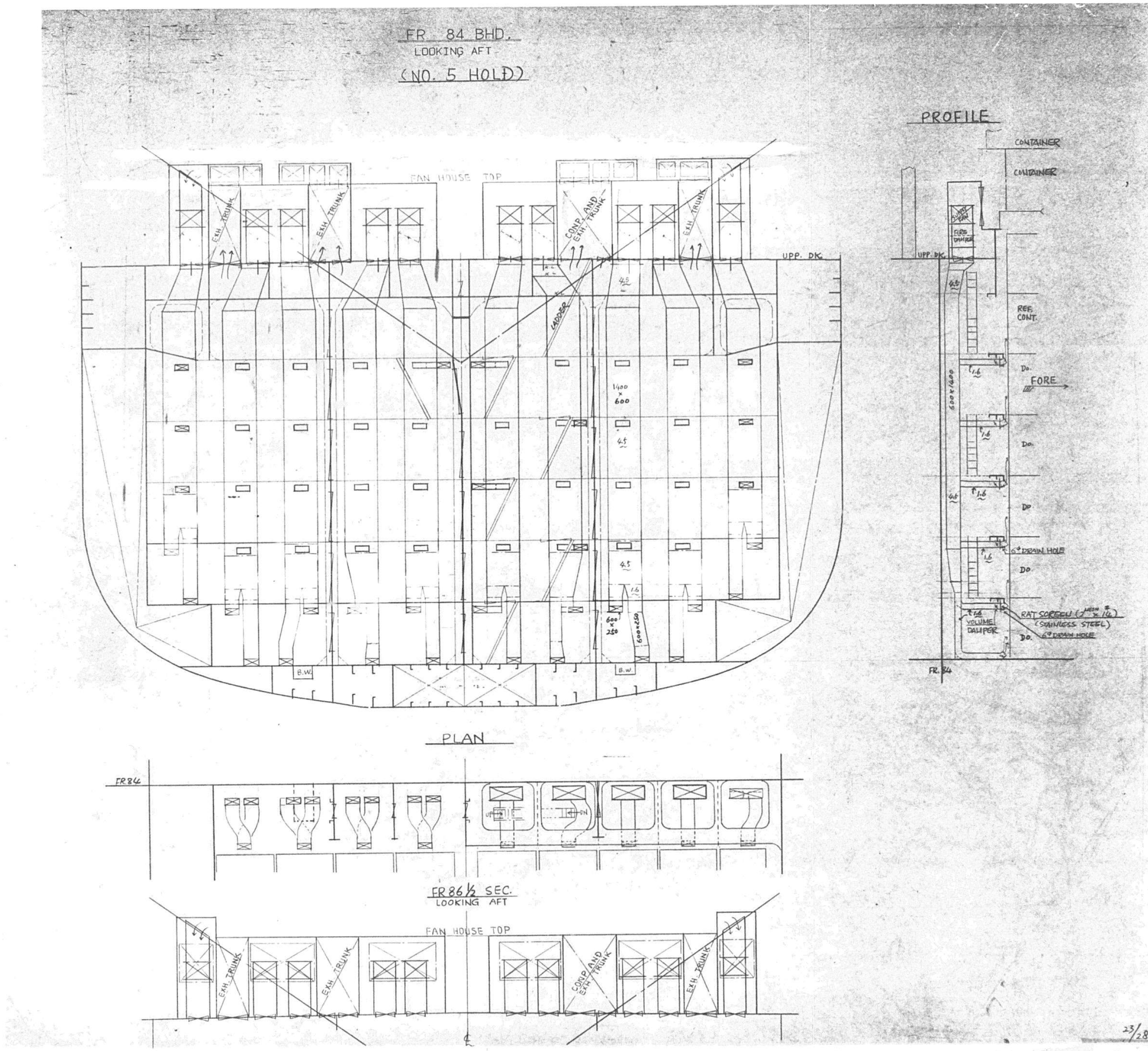
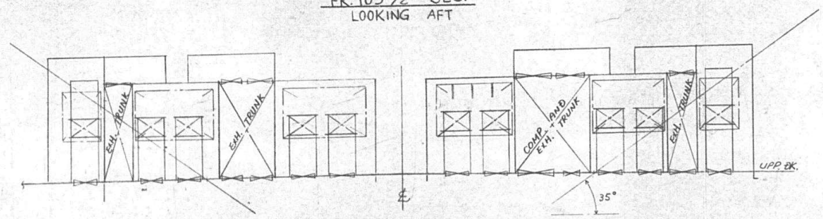
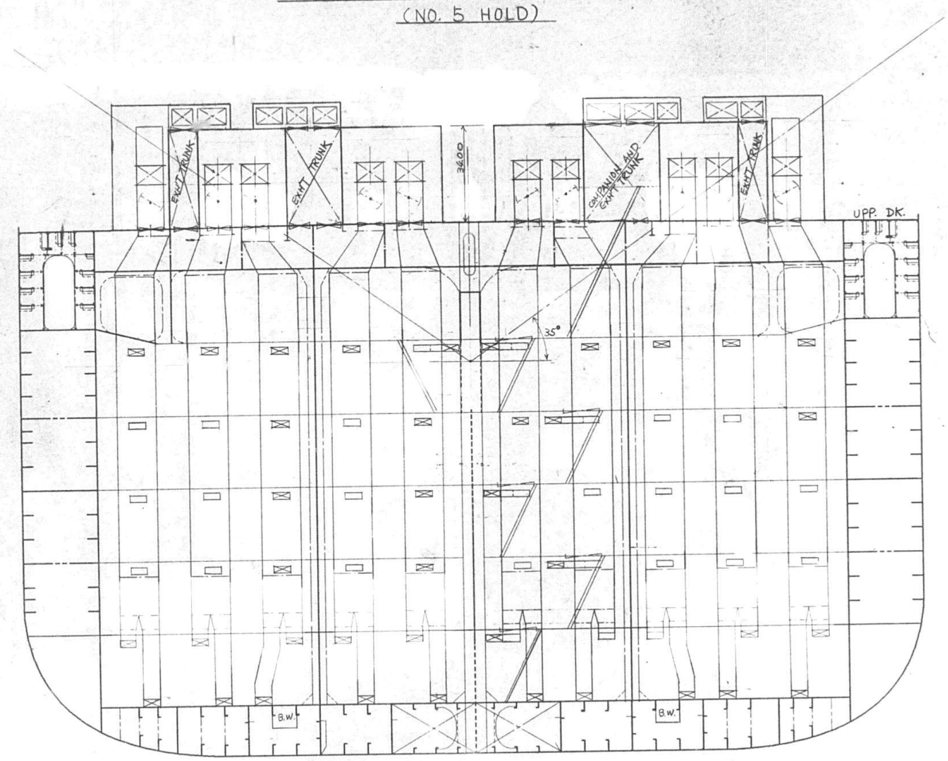

FR 84 BHD.
LOOKING AFT
(NO. 5 HOLD)
FAN HOUSE TOP
EXH. TRUNK
CORP. AND EXH. TRUNK
UPP. DK.
PROFILE
CONTAINER
FORE
PLAN
FR 84
FR 86½ SEC.
LOOKING AFT
FAN HOUSE TOP
EXH. TRUNK
23/28

1342

FR. 105 1/2 SEC.
LOOKING AFT



FR. 103 LOOKING AFT
SIMILAR TO FR. 84 EXCEPT WHERE SPECIALLY MENTIONED
(NO. 5 HOLD)



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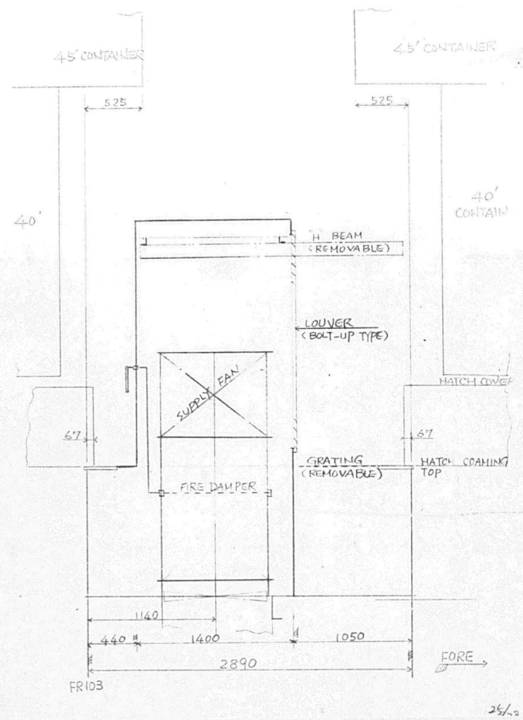
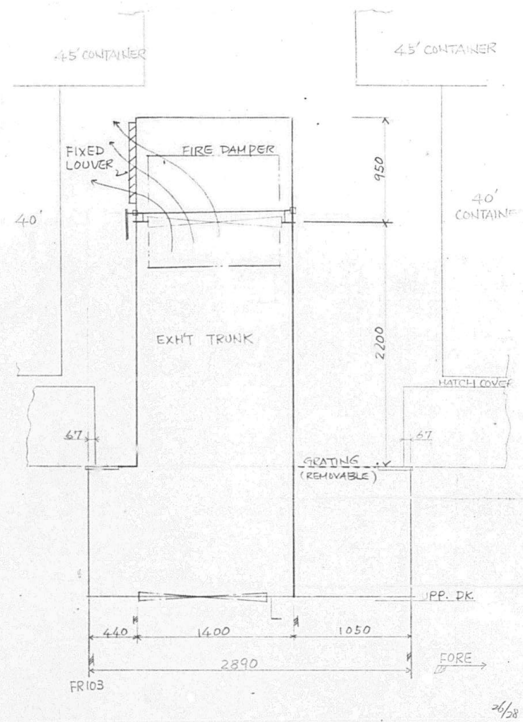
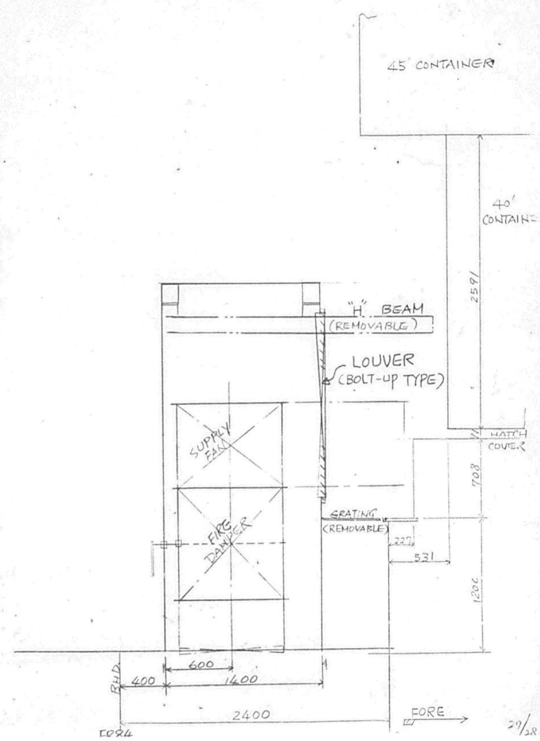
SUPPLY DUCT (FORE PART)



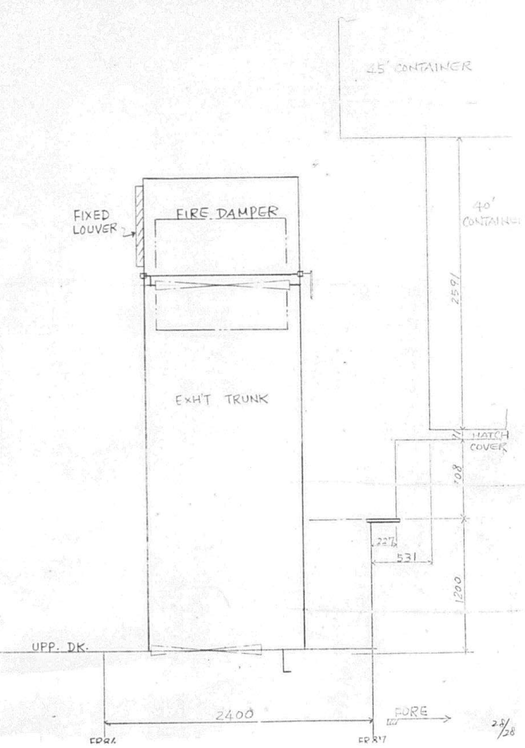
EXH'T DUCT (FORE PART)



SUPPLY DUCT (AFT PART)



EXH'T DUCT (AFT PART)



APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 31 '85	WITH COMMENT OFTS/MES-051	JUL. 18 1985	SER T8-2 M-22710		
1ST REVISED PLAN	OCT. 14 1985	OFTS/MES-062	DEC. 31 1985	SER T8-2 M-01298		

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — OUTFIT DESIGN SECT.

SHIP'S NO. **NO.1325** SHIP'S NAME **TILLIE LYKES**

居住区空調及び通風装置系統図

DIAGRAMMATIC ARR. OF AIR COND. AND VENT. SYSTEM FOR ACCOMM. SPACE

DATE APR. 25 '85 (TEL 2236)
JOB NO. TS1323/24/25

LYKES REF. NO. 380003 — MITSUI DRAWING NO. 4115101 — REV.

(33 SHEETS WITH COVER) 1/33

A4-ॐ B2-
A3-〃 B1-

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5. OCT. 1986	PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	S. Nishiguchi

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GENERAL NOTE

1. FIRE DAMPERS SHALL BE PROVIDED IN ACCORDANCE WITH USCG. REGULATION.

DWG.NO. 4115101

3/33

REFERENCE

NO.	REF. NO. MES	REF. NO. LYKES	DWG. NO.	DWG. NAME
1	0-101	380101	4115201	AXIAL FLOW FAN
2	0-102	930010	4115205	FIRE DAMPER (AUTO)
3	0-103	380302	4115301	AIR CONDITIONING PLANT FOR ACCOMM. SPACE
4	0-100	380301	4115105	TYPICAL INSULATION METHOD FOR DUCT AND
5				FREON PIPE OF VENT.
6	0-	930009	4109101	CONSTRUCTION OF FIRE PROTECTION
7			4115102	CALCULATION SHEETS VENTILATING PRESSURE
8				LOSS ACCOMMODATION SPACE (FOR OWNER'S REF.)
9			4115302	DETAILS OF HEAT LOAD CALCULATION
10				FOR AIR CONDITIONING PLANT (FOR OWNER'S REF.)
11			4115206	PENETRATION METHOD OF DUCTS & PIPES
12				FOR FIRE RETARDING WALL & DECK
13				
14				
15				
16				
17				
18				
19				
20				

DWG. NO. 4115101

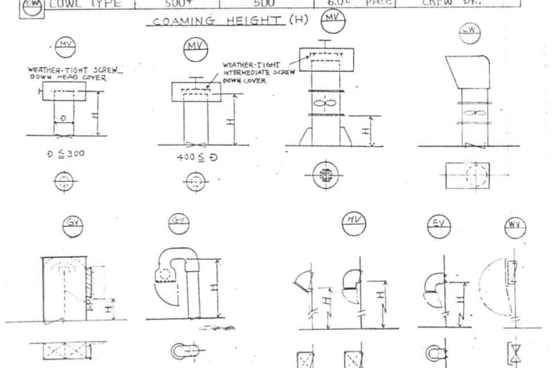
4/33

1345

COAMING HEIGHT & THICKNESS OF VENTILATOR

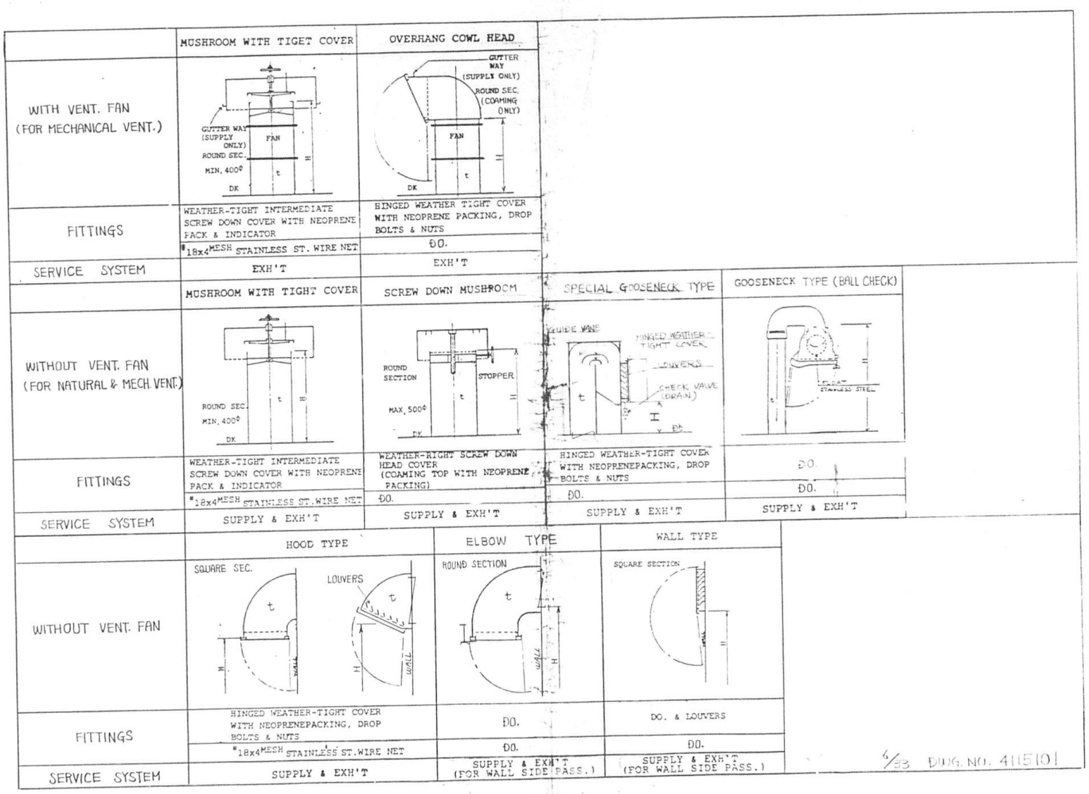
MARK	TYPE OF VENT	NOMINAL SIZE	COAMING (H) HEIGHT (mm)	COAMING (t) THICK (mm)	REMARKS
MV	MUSHROOM TYPE	250φ	760	9.3t pipe	SALOON DK (F'CLE DK.)
		150φ, 300φ, 400φ, 450φ	500	9.3t, 10.3t pipe; 6.0t, " plate	COMP. FLAT. NAV. BR. DK
GV	GOOSENECK TYPE WITH BALL CHECK	125φ, 150φ, 200φ	760	9.5t, 9.3t, 8.2t Pipe	SALOON DK
GV	SPECIAL GOOSENECK TYPE	ALL SIZE	760	12t plate	SALOON DK (F'CLE DK.)
WV	WALL TYPE	ALL SIZE	700 & OVER	10t Plate	UPPER DK
			2000 & OVER	6t & OVER Plate	CREW DK ~ SR. OFF. DK
			500 & OVER		NAV. BR. DK
EV	ELBOW TYPE	150φ, 200φ	2000 & OVER	9.3t, 8.2t Pipe	CREW DK ~ SR. OFF. DK
HV	HOOD TYPE	ALL SIZE	2000 & OVER	6.0t Plate	SALOON DK NAV. BR. DK
CW	COWL TYPE	500φ	500	6.0t plate	CREW DK.

COAMING HEIGHT (H)



NOTE
BRACKETS OF NATURAL MUSHROOM VENTILATOR TO BE FITTED WHEN THE COAMING HEIGHT IS 900 mm AND OVER.

5/33 DWG NO. 4115101



1346

TABLE OF SYMBOLS

SYMBOL	NOTE	SYMBOL	NOTE	
———	AIR CONDITIONING DUCT (WARM)		AUTO FIRE DAMPER	
- - -	AIR CONDITIONING DUCT (COOL)		CHANGE OVER/VOLUME DAMPER	
— - —	MECHANICAL SUPPLY VENTILATION DUCT		VOLUME DAMPER	
— - - —	MECHANICAL EXH'T		NON RETURN FLAP	
	NATURAL VENT. DUCT		AIR FLOW THROUGH THE DOOR VENETIAN	VENT. AREA 0.03 m²
	3.2^t DUCT			0.03 m²
G / G	GRID (CEILING & WALL TYPE)			0.05 m²
G	GRID WITH VOL. DAMPER		WALL TYPE VENTILATOR	
R	REGISTER		MUSHROOM TYPE VENT. WITH FAN	
R	REGISTER WITH VOLUME DAMPER		MUSHROOM TYPE VENTILATOR	
P	PUNKAH LOUVER		GOOSE NECK TYPE VENTILATOR	
	PAN TYPE DIFFUSER WITH SILENCER (DC-13)		ELBOW TYPE VENTILATOR	
	PANKAH LOUVER WITH SILENCER (DC-5)		UP / DN / UP DN	
	GREASE FILTER		AXIAL FLOW FAN	
	"A" CLASS CONSTRUCTION		COWL TYPE VENTILATOR	

NOTE 1. GRID TO BE #18×4 MESH STAINLESS STEEL WIRE.
2. PANKAH LOUVER TO BE OF ALUMINIUM ALLOY (JIS TYPE).

TRUNKING

1. ROUND DUCT (FOR BRANCH DUCT OF AIR CONDITIONING)

MATERIAL ; GALVANIZED STEEL PLATE
(15M/M ROCK WOOL PREINSULATED DUCT)
(USCG APPROVAL NO. 146,009/269/0)

THICKNESS	APPLICATION
0.8M/M	STRAIGHT SPIRAL DUCT
1.0M/M	ELBOW & OTHER PIECE

2. RECTANGULAR DUCT (FOR AIR COND. SUPPLY MAIN DUCT, AIR COND. RETURN DUCT, MACH. V. DUCT, NAT. V. DUCT, FRESH AIR INTAKE DUCT)

1) MATERIAL ;
GALVANIZED STEEL SHEET-----WALL THICKNESS IS 1.6 M/M & UNDER
UNGALVANIZED STEEL SHEET---WALL THICKNESS IS 2.3M/M &OVER

THICKNESS	APPLICATION
0.8 M/M	BREADTH OF DUCT IS 400M/M & UNDER IN ACCOMM. SPACE
1.2 M/M	BREADTH OF DUCT IS 401M/M TO 600M/M IN ACCOMM. SPACE
1.6 M/M	BREADTH OF DUCT IS ABOVE 601M/M IN ACCOMM.SPACE
2.3M/M	1. DUCT WELD. TO HULL CONSTRUCTION IN ACCOMM. SPACE 2. VERTICAL PART OF 300M/M ABOVE DK. IN SANITARY SPACE ONLY WHEN DUCT IS NOT COVERD BY LINING
3.2M/M	1. DUCT IN FWD. MACH. SPACE, AIR COND. UNIT ROOM

2) ALL AIR COND. SUPPLY DUCTS TO BE INSULATED. (RECTANGULAR DUCT ONLY)
(25mm ROCK WOOL INSULATION density 80kg/m³)

3) INSIDE OF AIR COND. MAIN SUPPLY & RETURN DUCTS TO BE INSULATED FOR THERMAL & NOISE.
(25mm ROCK WOOL INSULATION density 120kg/m³)

MACHANICAL VENTILATION FAN LIST

SYSTEM	FAN CAPACITY m³/min	mmAq	r.p.m.	SERVED SPACE	AIR CHANGE T/HOUR
NO.1 EXH. FAN (S. SIDE SANITARY SPACE) LVF-1	.31	30	1800 0.4kw	PRIVATE LAV. (22 RM'S) W.C. SERVICE LKR	10
				BAGGAGE LKR	5
NO.2 EXH. FAN (P. SIDE SANITARY SPACE) LVF-2	57	30	1800 0.75kw	PRIVATE LAV. (17 RM'S) W.C. Dr CHANG. RM SERVICE LKR	10
				LAUNDRY	15
				BAGGAGE LKR	5
NO.3 EXH. FAN (GALLEY) LVF-3	66	27	1800 0.75kw	GALLEY	40
NO.4 EXH. FAN (MISCEL. SPACE) LVF-4	31	30	1800 0.4kw	BOND SH. ST.	6
				OIL SKIN LKR, SWIMM. POOL LINEN LKR	10
NO.5 EXH. FAN (CO₂ ROOM) LVF-5	100	40	1800 1.5kw	CO₂ RM.	10
NO.6 EXH. FAN (FWD MACH SPACE) LVF-6	350	40	1800 5.5kw	FWD. MACH. SPACE	20
NO 7 EXH. FAN (ELEV. MACH. RM, ELEV. TRUNK FIRE STATION, FWD SWITCH B'D RM & GARB. RM) LVF-8	45	37	1800 0.75kw	FIRE STATION	5
				FWD. SWITCH BOARD RM.	40
				GARBAGE RM	30
				ELEV. MACH. RM	20
				ELEV. TRUNK	5
NO.1 SUPPLY FAN (GALLEY) LVF 7	30	27	1800 0.5kw	GALLEY	20

AIR CONDITIONING PLANT DESIGN CONDITION
FOR ACCOMM. SPACE

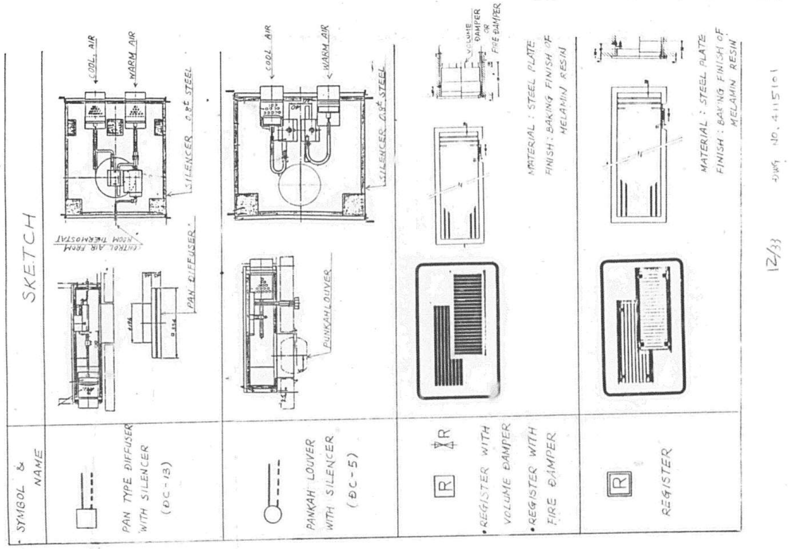
	HOT CLIMATE TEMP. DRY BULB	WET BULB	RELATIVE HUMIDITY	COLD CLIMATE TEMP. DRY BULB	RELATIVE HUMIDITY	INTER-MEDIATE
OUT SIDE	35°C	28°C	—	-18°C	—	—
ROOM	22°C	—	50%	22°C	50%	—
RATIO OF FRESH AIR TO SUPPLY AIR	30%			30%		100%

AIR CHANGES

PUBLIC RM.------------ 9 TIMES/hr
PRIVATE RM.----------- 6 "
SPOT COOLING SPACE----- 4 "

REQUIRED FRESH AIR

20.4 m³/h PER PERSON (PUBLIC ROOM)
25.5 m³/h " (PRIVATE ROOM)



AIR BALANCE SHEET

AC: AIR COND. M/E: MECH. EXH. N/E: NATURAL EXH. M/S: MECH. SUPPLY N/S: NATURAL SUPPLY

W/H: WHEEL H.
E/R: ELECT. RM.

AREA \ SYSTEM		A/C SUPPLY AIR (m³/h) ①	FRESH AIR IN A/C SUPP. AIR (m³/h) ①×30%	M/E OF A/C AIR (m³/h) ②	N/E OF A/C AIR ※1 (m³/h) ③	TOTAL A/C EXH. AIR (m³/h) ②+③	RETURN AIR (m³/h) (①-(②+③))
NAV. BR. DK.		3089	927	102	256 (W/H) 708 (E/R)	1066	2023
SR. OFF.'S DK.		6204	1861	679	1112 (RADIO RM.)	1791	4413
PASS. DK.		3898	1169	809	0	809	3089
BOAT DK.		3550	1065	736	0	736	2814
CREW DK.		2939	882	1170	0	1170	1769
SALOON DK.	ACCOMM. PART	5284	1585	424	302 (HOSPITAL)	726	4558
	GALLEY PANTRY	484	145	484	—	484	0
UPPER DK.		2725	818	490	166 (SLOP CHEST) 783 (SUEZ CANAL) 231 (DRY PROV. ST.)	1670	1055
TOTAL		28173	8452	4840	3612	8452	19721

NOTE: ※1
NORMALLY WALL VENT'S AT BOTH END OF PASSAGE ARE CLOSED AT AIR-COND OPERATION, AND OPENED AT INTERMEDIATE CLIMATE.

FRESH AIR RATIO

$$= \left(1 - \frac{\text{TOTAL RETURN AIR}}{\text{TOTAL A/C SUPPLY AIR}}\right) \times 100$$

$$= \left(1 - \frac{19721}{28173}\right) \times 100 = 30\%$$

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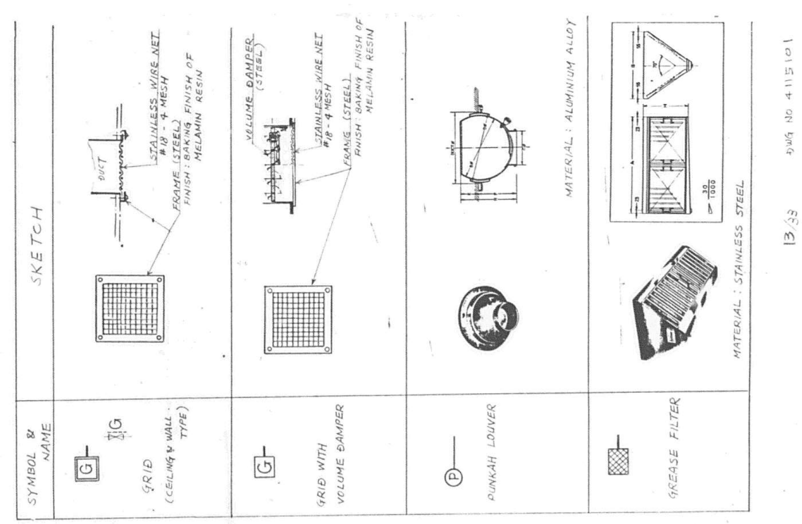
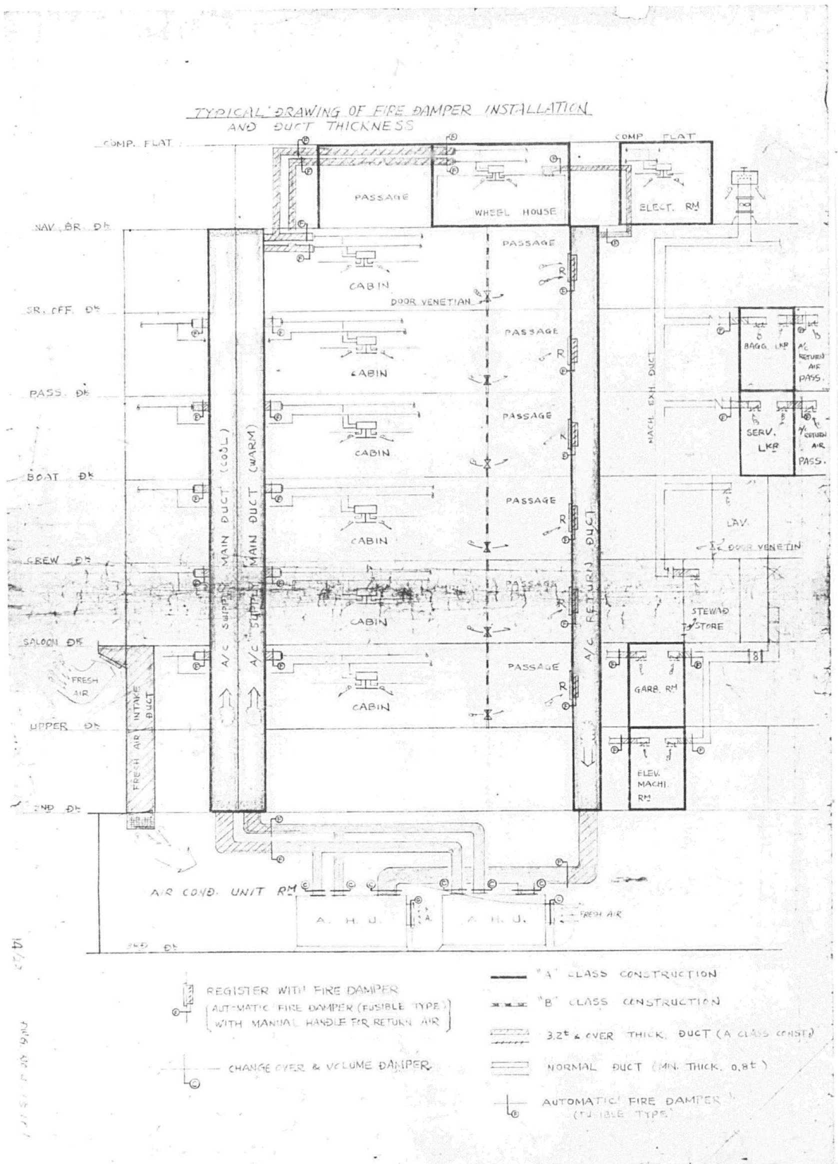
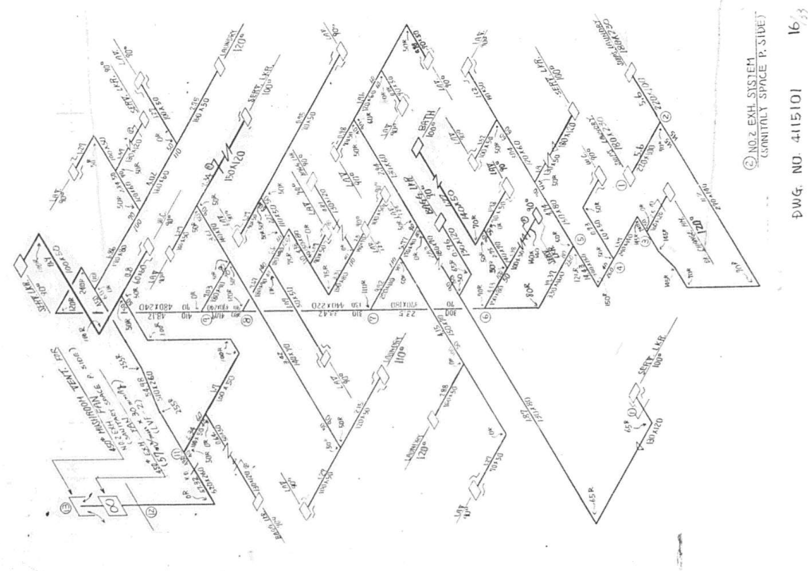
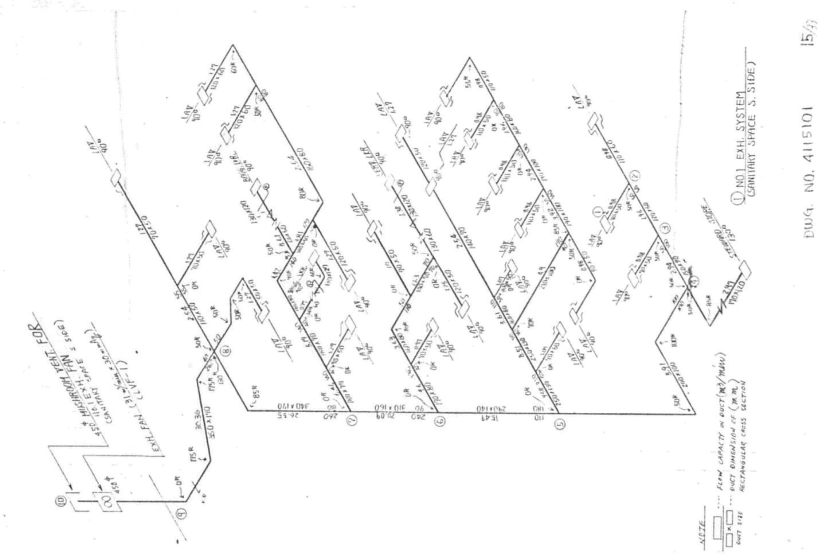
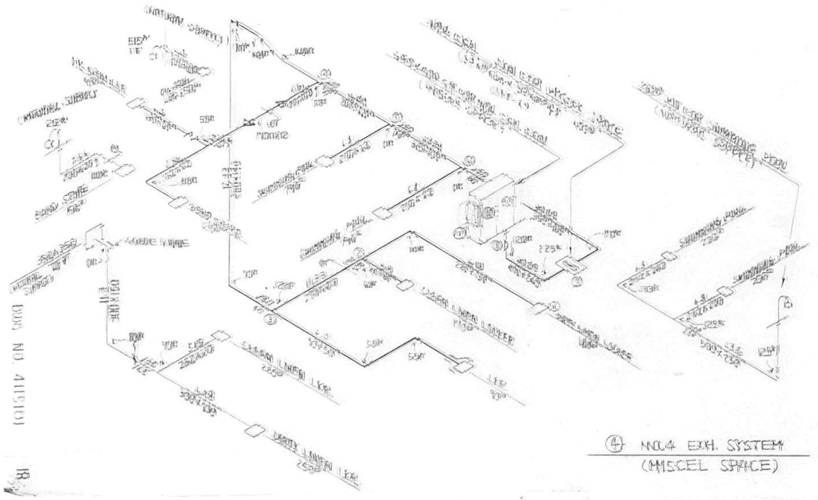
DWG. NO. 415101




TYPICAL DRAWING OF FIRE DAMPER INSTALLATION
AND DUCT THICKNESS
COMP. FLAT
PASSAGE
WHEEL HOUSE
ELECT. RM
NAV. BR. DK
CABIN
PASSAGE
DOOR VENETIAN
SR. OFF. DK
PASS. DK
BOAT DK
CREW DK
SALOON DK
UPPER DK
2ND DK
A/C SUPPLY MAIN DUCT (COOL)
A/C SUPPLY MAIN DUCT (WARM)
A/C RETURN DUCT
MACH. EXH. DUCT
BAGG. LKR
A/C RETURN AIR PASS.
SERV. LKR
LAV.
STEWD STORE
GARB. RM
ELEV. MACHI. RM
FRESH AIR INTAKE DUCT
FRESH AIR
AIR COND. UNIT RM
A. H. U.
A. H. U.
REGISTER WITH FIRE DAMPER
AUTOMATIC FIRE DAMPER (FUSIBLE TYPE) WITH MANUAL HANDLE FOR RETURN AIR
CHANGE OVER & VOLUME DAMPER
"A" CLASS CONSTRUCTION
"B" CLASS CONSTRUCTION
3.2t & OVER THICK. DUCT (A CLASS CONST.)
NORMAL DUCT (MIN. THICK. 0.8t)
AUTOMATIC FIRE DAMPER (FUSIBLE TYPE)
14/33

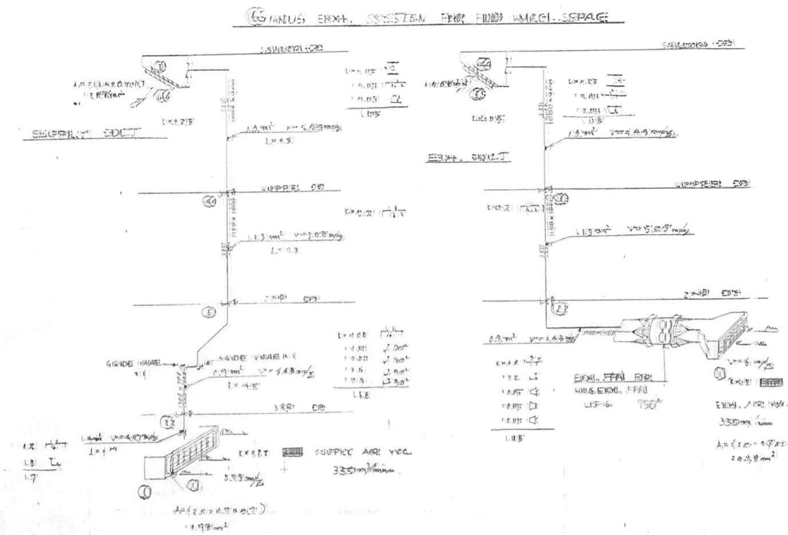

② NO.2 EXH. SYSTEM (SANITARY SPACE P. SIDE)
DWG. NO. 4115101
16/33

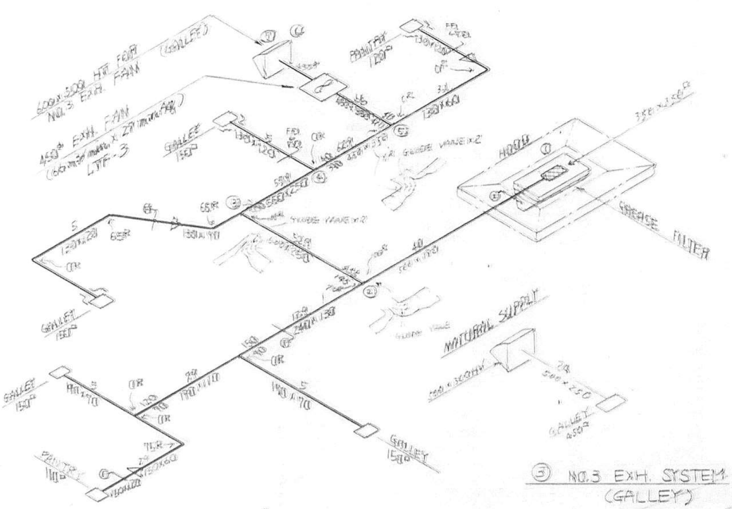

① NO.1 EXH. SYSTEM (SANITARY SPACE S. SIDE)
DWG. NO. 4115101
15/33



④ NO.4 EXH. SYSTEM
(MISCEL SPACE)

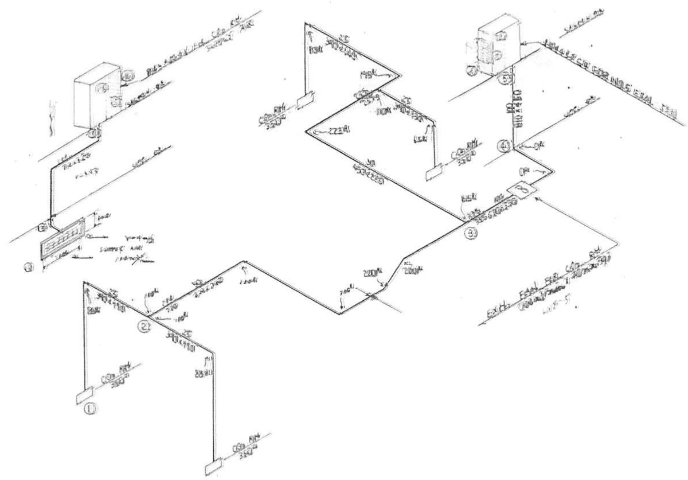
DWG. NO. 415101





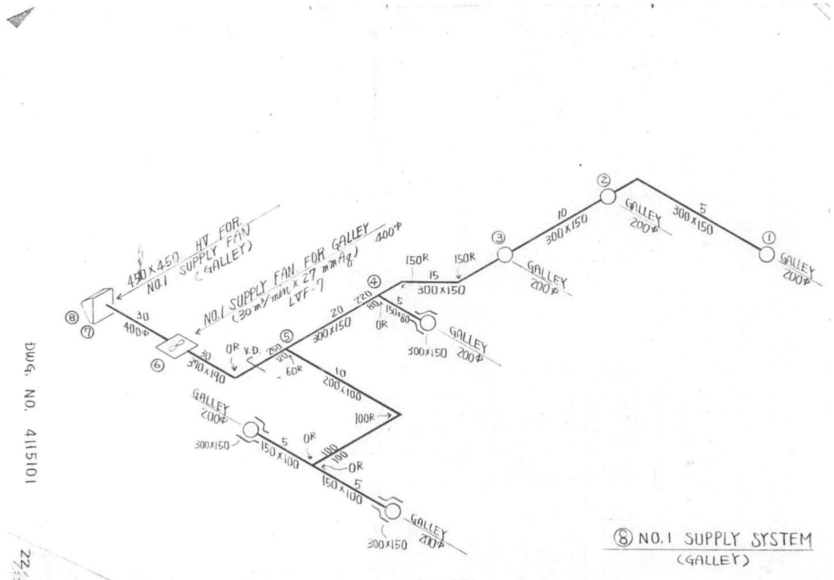
③ NO.3 EXH. SYSTEM
(GALLEY)

DWG. NO. 415101

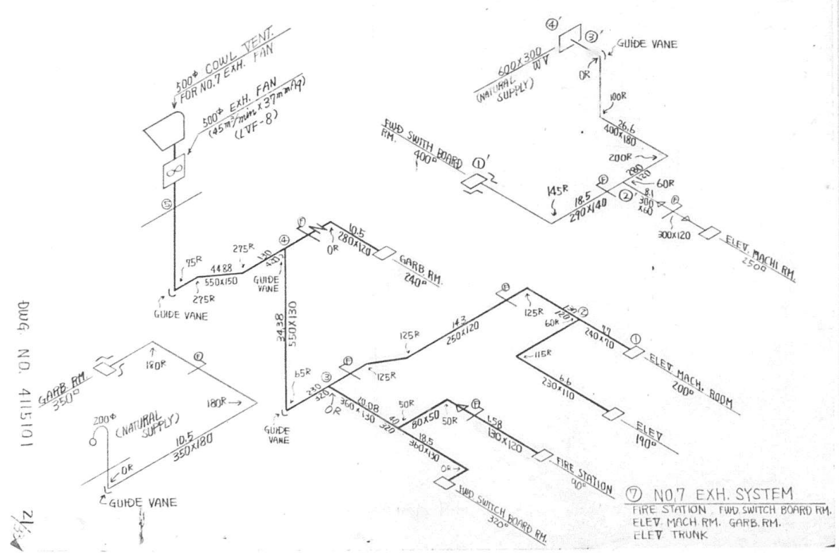


⑤ NO.5 EXH. SYSTEM
(CO2)

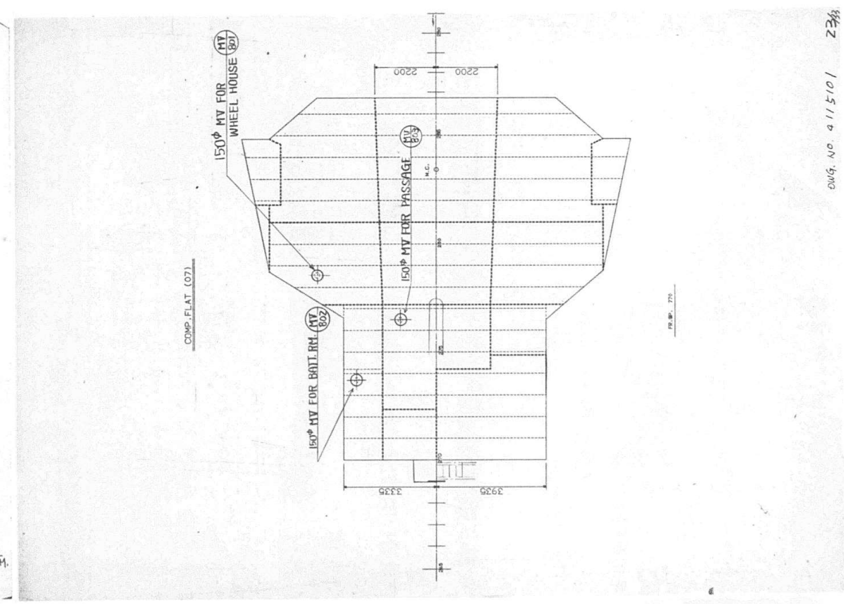
1350

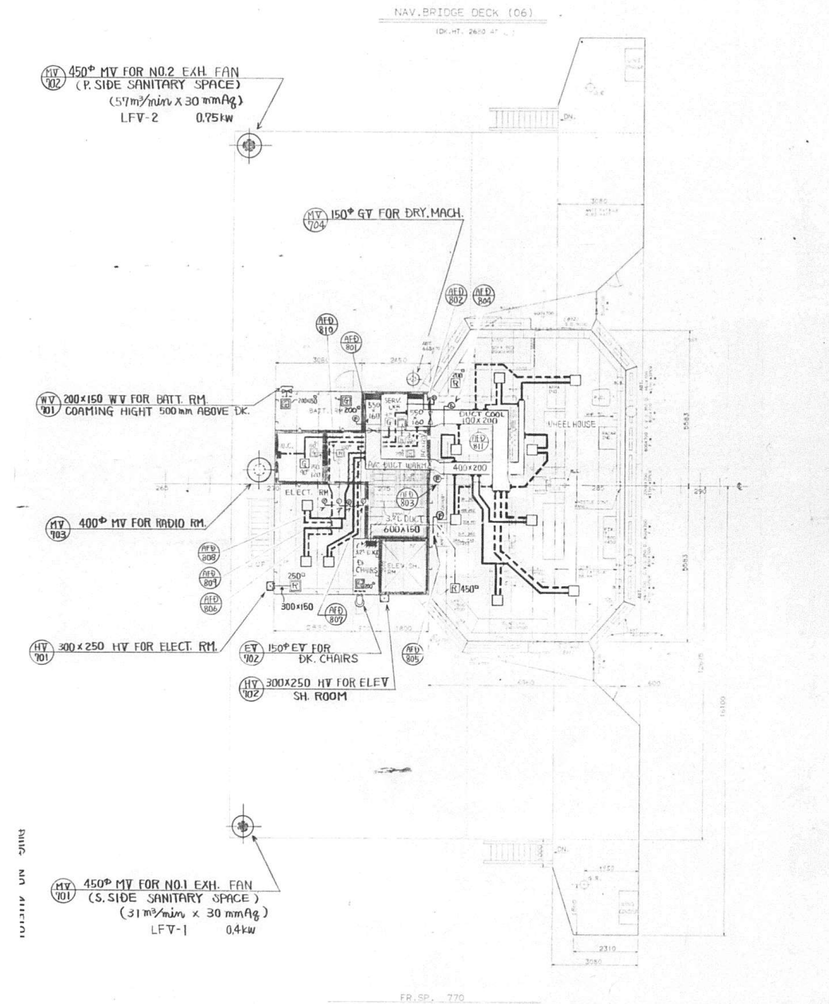


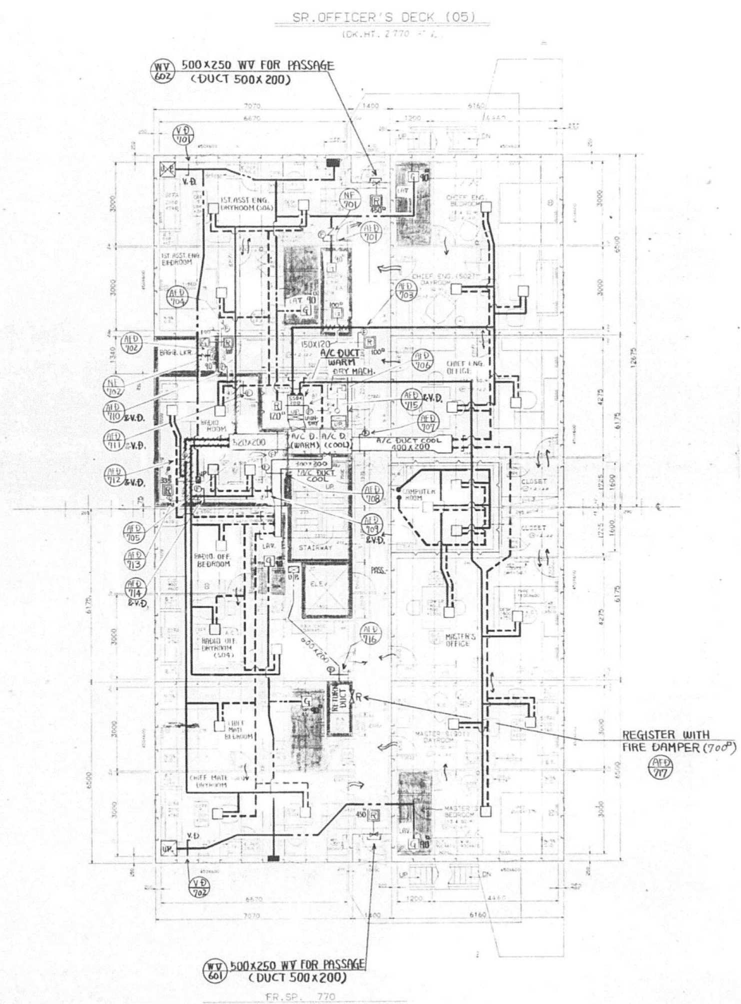
⑧ NO.1 SUPPLY SYSTEM
(GALLEY)



⑦ NO.7 EXH. SYSTEM
FIRE STATION, FWD SWITCH BOARD RM.
ELEV. MACH. RM. GARB. RM.
ELEV. TRUNK







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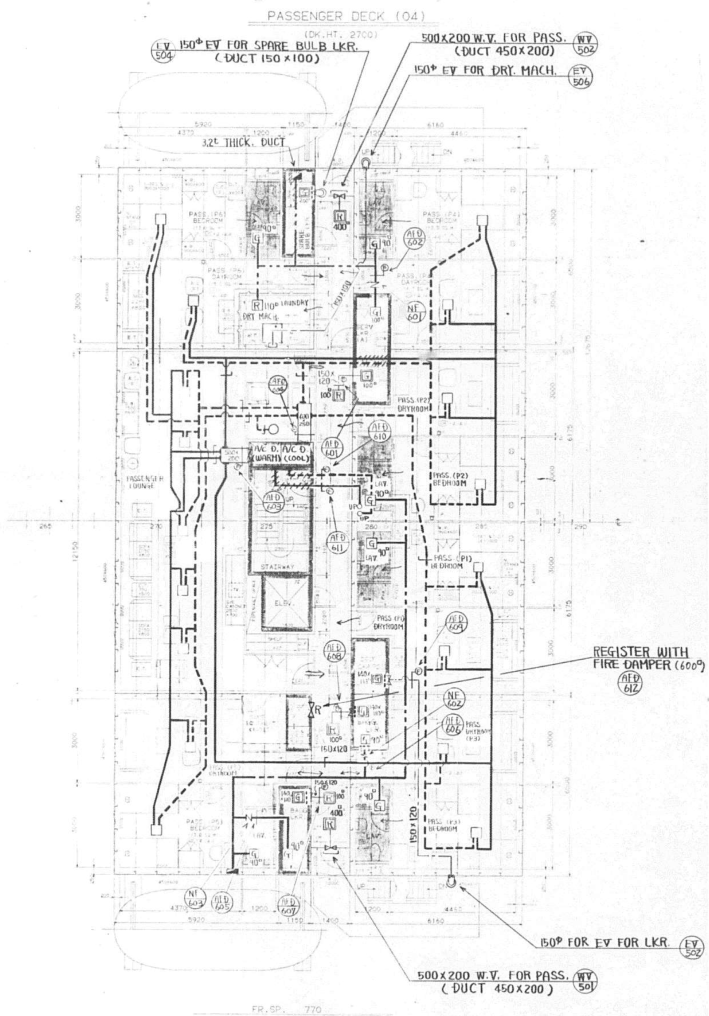
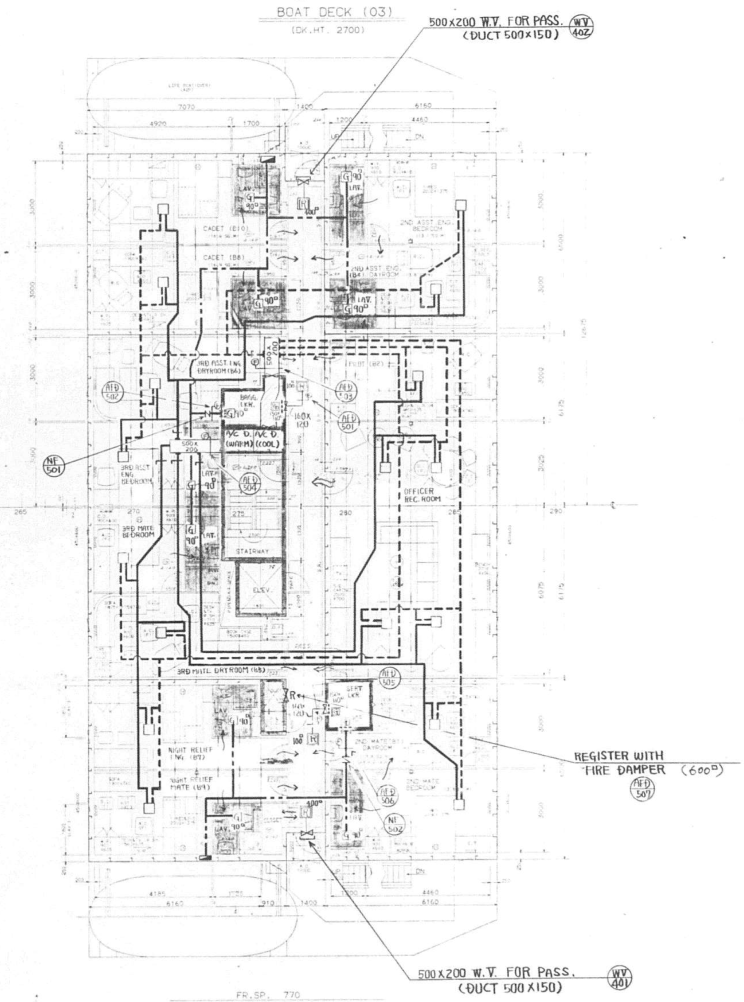
25

1352



DWG. NO. 4115101

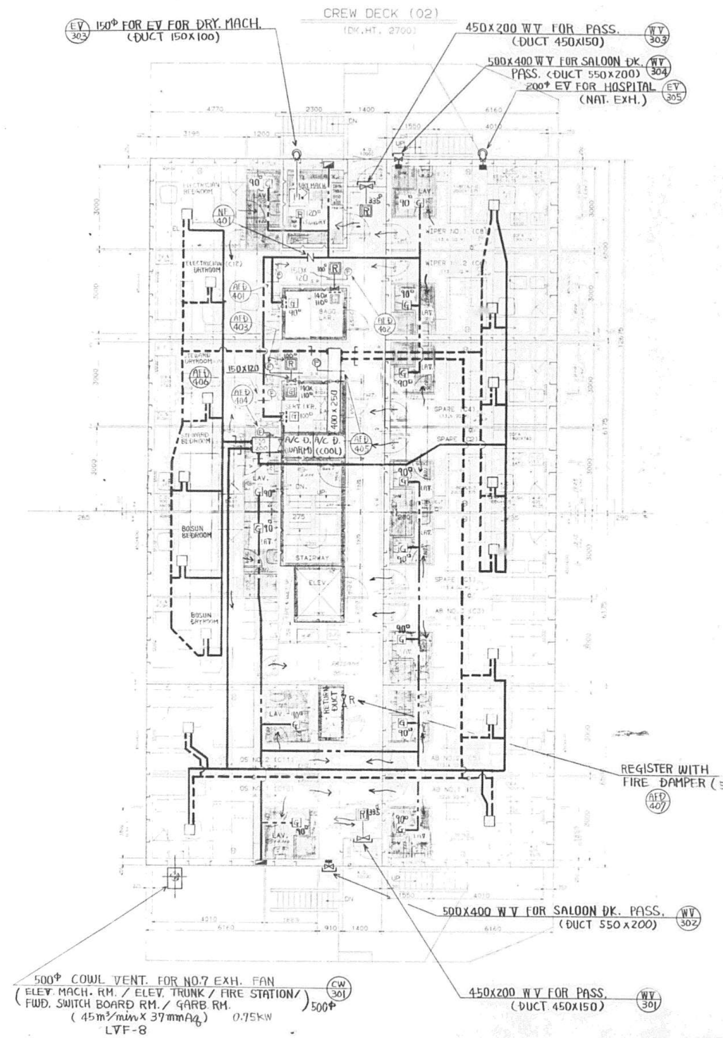
26/33

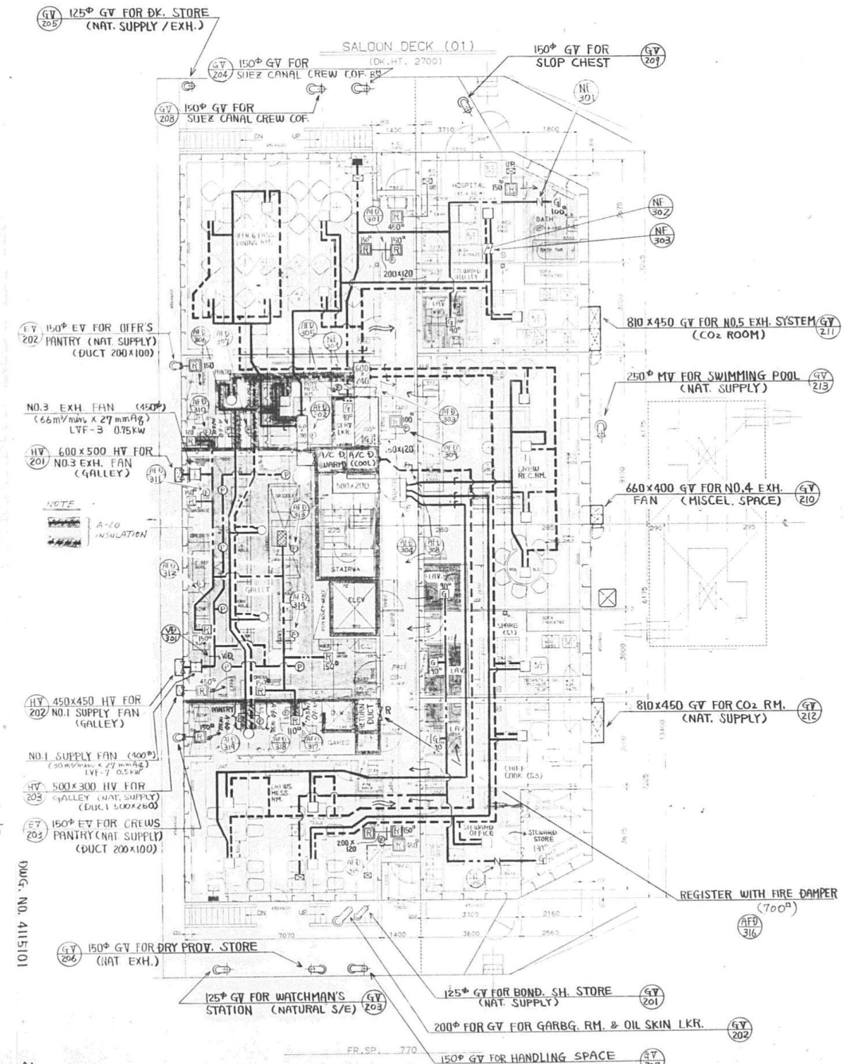


DWG. NO. 4115101

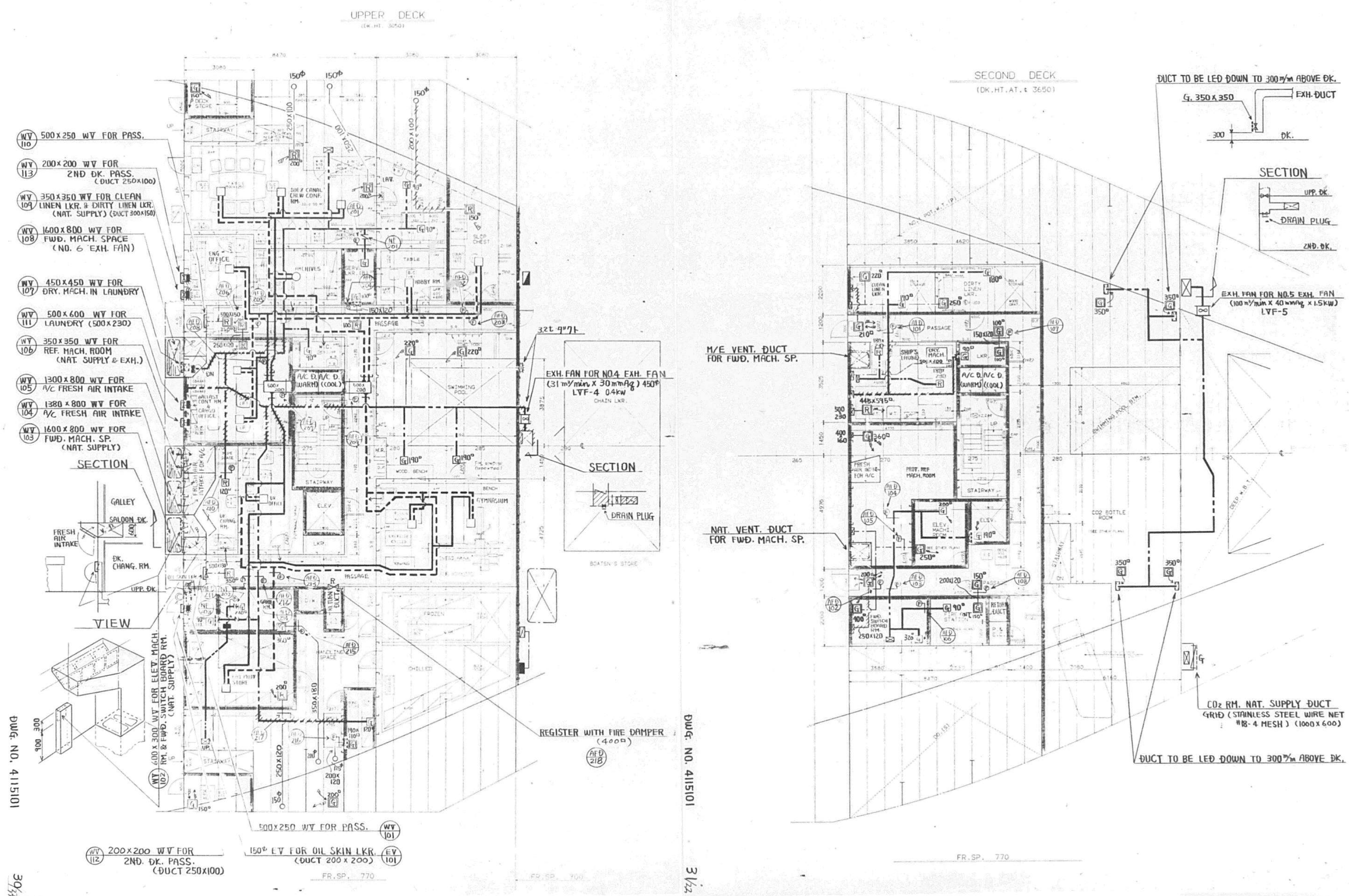
27/33

1353


CREW DECK (02)
(DK. HT. 2700)
EV 303 150Φ FOR EV FOR DRY. MACH. (DUCT 150X100)
450X200 WV FOR PASS. (DUCT 450X150) WV 303
500X400 WV FOR SALOON DK. PASS. (DUCT 550X200) WV 304
200Φ EV FOR HOSPITAL (NAT. EXH.) EV 305
REGISTER WITH FIRE DAMPER (500□) AFD 407
500X400 WV FOR SALOON DK. PASS. (DUCT 550X200) WV 302
500Φ COWL VENT. FOR NO.7 EXH. FAN (ELEV. MACH. RM. / ELEV. TRUNK / FIRE STATION / FWD. SWITCH BOARD RM. / GARB. RM.) 500Φ CW 301
(45m³/min X 37mmAq) 0.75KW
LVF-8
450X200 WV FOR PASS. (DUCT 450X150) WV 301
DWG. NO. 4115101
28/33

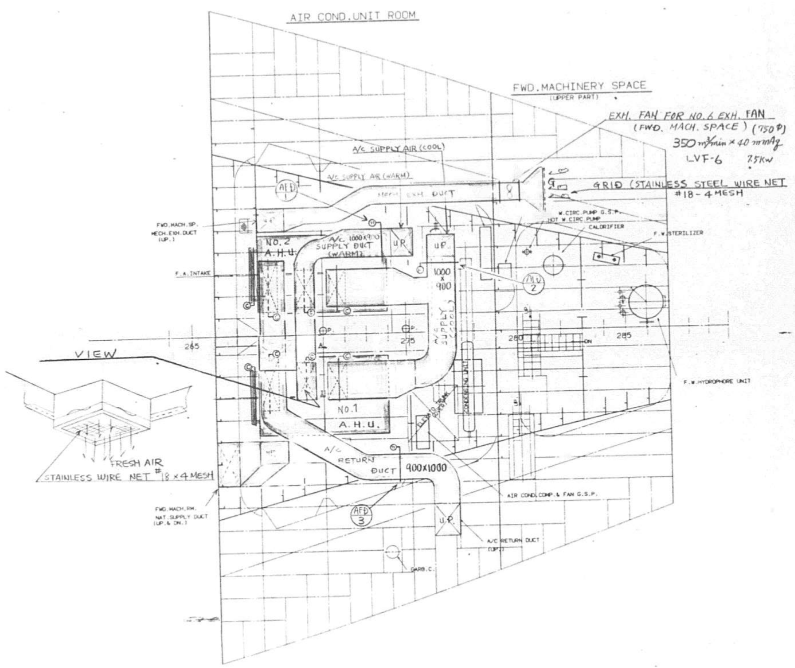

SALOUN DECK (01)
(DK. HT. 2700)
GV 205 125Φ GV FOR DK. STORE (NAT. SUPPLY / EXH.)
GV 204 150Φ GV FOR SUEZ CANAL CREW COF.
GV 208 150Φ GV FOR SUEZ CANAL CREW COF.
150Φ GV FOR SLOP CHEST GV 209
NF 301
NF 302
NF 303
EV 202 150Φ EV FOR OFFR'S PANTRY (NAT SUPPLY) (DUCT 200X100)
810X450 GV FOR NO.5 EXH. SYSTEM (CO₂ ROOM) GV 211
250Φ MV FOR SWIMMING POOL (NAT. SUPPLY) GV 213
NO.3 EXH. FAN (450Φ) (66m³/min X 27mmAq) LVF-3 0.75KW
HV 201 600X500 HV FOR NO.3 EXH. FAN (GALLEY)
NOTE
A-60 INSULATION
660X400 GV FOR NO.4 EXH. FAN (MISCEL. SPACE) GV 210
HV 202 450X450 HV FOR NO.1 SUPPLY FAN (GALLEY)
810X450 GV FOR CO₂ RM. (NAT. SUPPLY) GV 212
NO.1 SUPPLY FAN (400Φ)
HV 203 500X300 HV FOR GALLEY (NAT. SUPPLY) (DUCT 500X260)
EV 203 150Φ EV FOR CREWS PANTRY (NAT SUPPLY) (DUCT 200X100)
REGISTER WITH FIRE DAMPER (700□) AFD 316
GV 206 150Φ GV FOR DRY PROV. STORE (NAT EXH.)
125Φ GV FOR WATCHMAN'S STATION (NATURAL S/E) GV 203
125Φ GV FOR BOND. SH. STORE (NAT. SUPPLY) GV 201
200Φ FOR GV FOR GARBG. RM. & OIL SKIN LKR. GV 202
150Φ GV FOR HANDLING SPACE GV 207
FR. SP. 770
DWG. NO. 4115101
29/33

1354

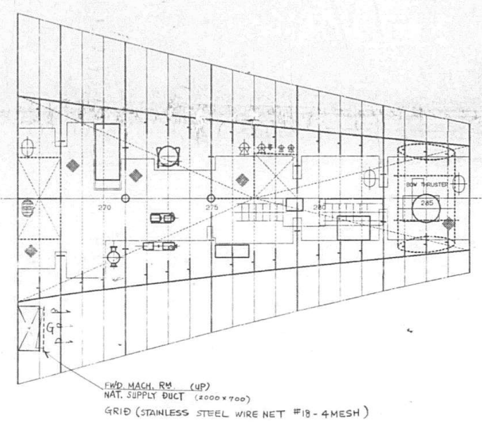

UPPER DECK
WV 110 500×250 WV FOR PASS.
WV 113 200×200 WV FOR 2ND DK. PASS. (DUCT 250×100)
WV 109 350×350 WV FOR CLEAN LINEN LKR. & DIRTY LINEN LKR. (NAT. SUPPLY) (DUCT 300×150)
WV 108 1600×800 WV FOR FWD. MACH. SPACE (NO. 6 EXH. FAN)
WV 107 450×450 WV FOR DRY. MACH. IN LAUNDRY
WV 111 500×600 WV FOR LAUNDRY (500×230)
WV 106 350×350 WV FOR REF. MACH. ROOM (NAT. SUPPLY & EXH.)
WV 105 1300×800 WV FOR A/C FRESH AIR INTAKE
WV 104 1380×800 WV FOR A/C FRESH AIR INTAKE
WV 103 1600×800 WV FOR FWD. MACH. SP. (NAT. SUPPLY)
SECTION
GALLEY
SALOON DK.
FRESH AIR INTAKE
DK. CHANG. RM.
UPP. DK.
VIEW
WV 102 600×300 WV FOR ELEV. MACH. RM. & FWD. SWITCH BOARD RM. (NAT. SUPPLY)
DWG. NO. 4115101
EXH. FAN FOR NO.4 EXH. FAN (31 m³/min × 30 mmAq) 450φ LVF-4 0.4kW
SECTION
DRAIN PLUG
REGISTER WITH FIRE DAMPER (400φ)
AFD 218
500×250 WV FOR PASS. WV 101
150φ EV FOR OIL SKIN LKR. (DUCT 200×200) EV 101
WV 112 200×200 WV FOR 2ND. DK. PASS. (DUCT 250×100)
FR. SP. 770
DWG. NO. 4115101
SECOND DECK
(DK. HT. AT ¢ 3650)
DUCT TO BE LED DOWN TO 300 m/m ABOVE DK.
G. 350×350
EXH. DUCT
DK.
SECTION
UPP. DK.
DRAIN PLUG
2ND. DK.
EXH. FAN FOR NO.5 EXH. FAN (100 m³/min × 40 mmAq × 1.5kW) LVF-5
M/E VENT. DUCT FOR FWD. MACH. SP.
NAT. VENT. DUCT FOR FWD. MACH. SP.
CO₂ RM. NAT. SUPPLY DUCT GRID (STAINLESS STEEL WIRE NET #18-4 MESH) (1000×600)
DUCT TO BE LED DOWN TO 300 m/m ABOVE DK.
FR. SP. 770

1355

3RD DECK



FWD. MACHINERY FLOOR



DWG NO 411-101

DWG NO 411-101

1356

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	AUG 22 1985	—	NOV. 14 1985	T-8-2		
1ST REVISED PLAN	OCT. 11 1985	WITH COMMENT OFTS/MES-1044	NOV. 22 1985	T-8-2		
2ND REVISED PLAN	FEB. 11 1986	OFTS/MES-1201				

SUP.	1
O.F.	2
USCG(MMT)	
USCG(OCMI)	
USPH	
ABS(N.O.)	8
ABS(TOKYO)	
MHI	R/1

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

居住区
空調装置制御空気管系統図
DIAGRAM OF CONTROL AIR PIPE FOR AIR CONDITIONING IN ACCOMM. SPACE

OUTFIT DESIGN SECT. — (stamp: MITSUI ENGINEERING & SHIPBUILDING CO. — SHIP DESIGN DEPARTMENT)

DATE AUG 6 1985 TEL.22361 — JOB NO. TS/323/24/25 — SCALE ~ — LYKES REF. NO. 380307 — MITSUI DRAWING NO. 4115303 — REV.

(17 SHEETS WITH COVER) 1/17

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	OCT. 5 1986	PREPARED FOR S. NO 1325 AS FINISHED	OCT. 5 1986 KM

2

GENERAL NOTE

1. ALL STEEL PIPES SHALL BE GALVANIZED.
2. DAMAGED PARTS OF GALVANIZED PIPES BY WELDING ON BOARD SHALL BE TOUCHED UP WITH ZINC-RICH PAINT AFTER SURFACE PREPARATION.
3. POSITION OF THERMOSTAT SHOWN IN PAGE 10/17 ~ 4/17 ARE DECIDED IN CONSIDERATION OF FOLLOWING ITEMS.
   1) THERMOSTAT TO BE FITTED ON LINING (TNF) AT OR ABOVE 1600mm.
   2) THERMOSTAT TO BE FITTED AT NEAR ENTRANCE OF EACH CABIN.
   3) PIPING SPACE OF CONTROL AIR FOR THERMOSTAT IS NECESSARY AND THIS PIPING IS LED BETWEEN LINING (TNF) AND STEEL WALL (HULL CONSTRACTION) BECAUSE THE PIPING IS UNABLE TO FITTING ON LINING (TNF) AS POOR-LOOKING.
   4) INSTALLATION METHOD OF THERMOSTAT IS SHOWN ON PAGE 9/17.

DWG.NO. 4115303 - 3/17

REFERENCE

NO.	REF. NO. LYKES	DWG. NO.	DWG. NAME
1	480001	4116002	PIPING PRACTICE
2	190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
3	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
4	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
5	482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS.
6	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
7		5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
8		5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
9		5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
10		5131205	GASKET (GENERAL USE)
11	380003	4115101	DIAGRAMMATIC ARRANGEMENT OF AIR
12			COND. AND VENT. SYSTEM FOR
13			ACCOMMODATION SPACE
14	380302	4115301	AIR CONDITIONING PLANT FOR ACCOMM. SPACE
15	482407	5233114	BRONZE VALVES
16			
17			
18			
19			
20			

DWG NO. 4115303 4/17

1357

DWG. NO. 4115303 — 1/17

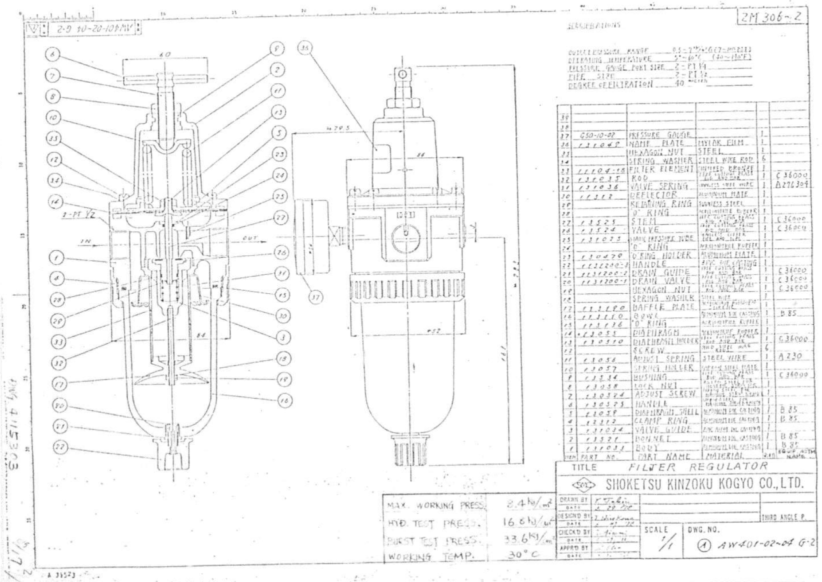
FITTING LIST (1/1)

SYMBOL	TYPE	SERVICE	PRESS. RATE (kg/cm^2)	MAX. WORK. PRESS. (kg/cm^2)	WORK. TEMP. °C	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
⋈	GLOBE VALVE	CONTROL AIR	10	8.4	30°C	BRONZE (BC6) JIS H 5111 (EQUIV. TO ASTM B62)	STAINLESS ST. (SUS 304) JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)		15	1/2	6	VAV-101~6	SEE PAGE 7/17
									20	3/4	1	VAV-202	
(1.25k, 8.4k)	FILTER REGULATOR	↓	↓	↓	↓	SEE PAGE 9/17			15	1/2	6	VAV-111~6	MAKER'S FURNISHED
	THERMOSTAT	↓	1.25	1.79	↓	(SEE OTHER DWG No. 4115301)					76		MAKER'S FURNISHED
	PRESSURE RELAY	↓	↓	2.14	↓	↓					44		MAKER'S FURNISHED
	DIFFUSER	—	—	—	—	—	—	—			119		SEE OTHER PLAN DWG. NO. 4115301

DWG NO. 4115303 — 5/17

PIPING LIST (1/1)

SYSTEM (SERVICE)	MAX. WORK. PRESS	WORK. TEMP.	HYD. TEST PRESS.	PIPE MATERIAL		LIST NO STANDARD		NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
CONTROL AIR PIPE LINE (FOR DAMPER REMOTE CONTROL)	8.4k (119psi)	30°C (86°F)	MAX. WORK. PRESS.	WELDED CARBON STEEL STPG 38-E JIS G 3454 (EQUIVALENT TO ASTM A53-GrA)	GALVANIZED	VA-101-109		15	1/2	21.7	2.8	40	JIS 10k	SLIP-ON FLANGE OR WELDED SLEEVE	FLANGE SS41-P (EQUIVALENT TO ASTM A36) SLEEVE STS38-S JIS G 3455 (EQUIVALENT TO ASTM A106 GrA)	II	II
						VA-201-209		20	3/4	27.2	2.9	40					
CONTROL AIR SMALL BORE PIPE LINE (FOR DAMPER REMOTE CONTROL)	1.75k (17.5psi)	30°C (86°F)	MAX. WORK. PRESS.	SEAMLESS COPPER PIPE JIS H 3300 C1220T-O (EQUIVALENT TO ASTM B88 C12200)	—	VA-1-		4		6.0	1.0	—	—	FLARED JOINT	BRASS (JIS C 3604) (EQUIVALENT TO ASTM B16) OR NAVAL BRASS (JIS C 4641B) (EQUIVALENT TO ASTM B21)	II	II



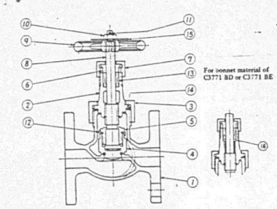
DWG. NO. 4115303 — 7/17

F 7348-1982

BRONZE 16kg/cm² STOP GLOBE VALVE

SYMBOL : ⋈

For bonnet material of C3771 BD or C3771 BE



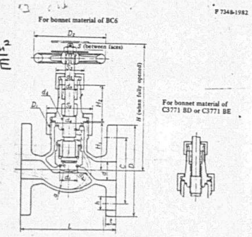
MATERIAL FOR COOLING SEA W	No.	Component	Material
	1	Body	JIS H 5111 – BC6 (ASTM-B62)
	2	Bonnet	~~JIS H 3250 – C 3771 BD or C 3771 BE or~~ JIS H 5111 – BC6 (ASTM-B62)
	3	Bonnet nut	
	4	Disc	
	5	Disc nut	
	6	Packing gland	~~JIS H 3260 – C 3771 BD or~~ JIS H 5111 – BC6 (ASTM-B62)
	7	Gland nut	
JIS H3250-ABB2 (CDA 619)	8	Stem	JIS G 4303 ~~JIS H 3260 – C 3771 BD or JIS H 5111 – BC6~~ (ASTM A276 TYPE 304)
	9	Handwheel	JIS G 5501 – FC 20 (ASTM A126 GRDE A)
	10	Hexagon nut	JIS H 3250 – C 3771 BD (ASTM B124 C37700)
	11	Split pin	JIS H 3260 – C 2600 W
	12	Disc lock washer	~~JIS H 3100 – C 2600 P~~ JIS G 4303 SUS303P (ASTM A240 TYPE 304)
	13	Packing	~~JIS P 3103~~ NON ASBESTOS
	14	Gasket	
	15	Name plate	JIS H 3100 – C 2801 P
	16	Seat ring	JIS H 3250 – C 3771 BD or C 3771 BE

Remark: Letters in boldface show the materials specified in 4. (1).

Fig. 2

For bonnet material of BC6

For bonnet material of C3771 BD or C3771 BE



Bolt holes of flanges shall straddle body center lines.

Unit: mm

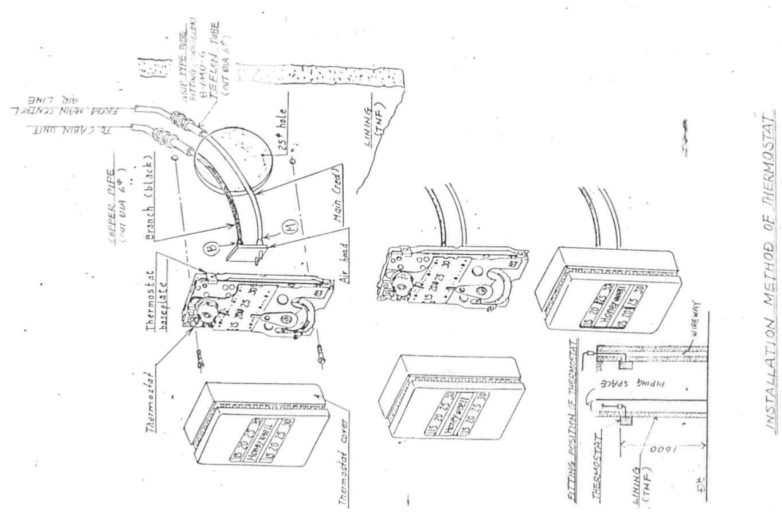
Nominal dia.	d	d_1	L	Flange D	Flange Bolt hole P.C. dia. C	Flange Bolt hole No.	Flange Bolt hole h	Flange Nominal of bolt dia.	Flange t	Height H (when fully opened)	Lift l	Handwheel D_2	Body d_2	Body a	Body R	Body H_1	Body Threads D_1	Body d_3	Ht. of bonnet H_2	Stem d_4	Stem Threads d_4	Stem S	Stuffing box d_5	Between faces S_1	Between faces S_2	Reference Calculated mass (kg)
15	15	15	110	95	70	4	15	M12	12	155	10	80	37	4	37	55	M45 × 2	32	43	10	TW14	8	17	55	32	2.96
20	20	20	120	100	75	4	15	M12	14	165	12	100	45	4	45	60	M48 × 2	35	47	12	TW16	10	19	55	36	3.72
25	25	25	130	125	90	4	19	M16	14	185	14	125	52	4	52	68	M52 × 2	38	54	13	TW18	10	21	60	36	5.65
32	32	32	160	135	100	4	19	M16	16	195	17	125	65	5	65	70	M60 × 2	42	56	13	TW18	10	21	70	36	7.28
40	40	40	180	140	105	4	19	M16	16	210	20	140	80	6	80	78	M68 × 2	50	59	15	TW20	12	23	80	41	9.12

Remarks:
1. The flanges shall conform to nominal pressure 16 kgf/cm^2 of JIS B 2240.
2. The threads d_4 shall conform to JIS B 0222, and D_1 to JIS B 0207.
3. The name plate shall be specified by purchaser as required.

Fig. 1

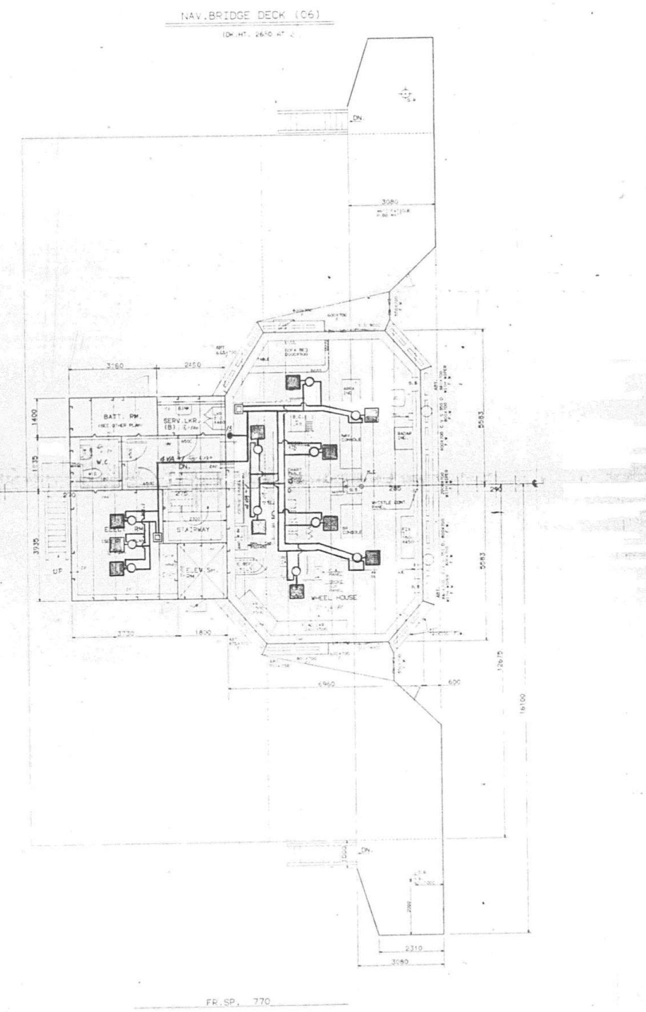
NOTE : SEE OTHER'S DWG. DWG. NO. 5233114 BRONZE VALVES

1358



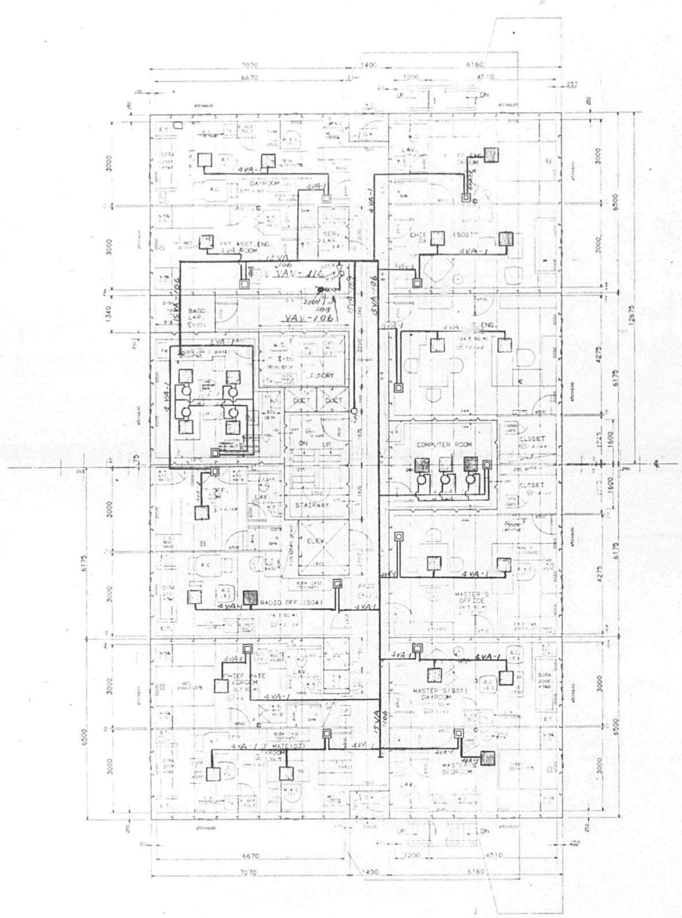
INSTALLATION METHOD OF THERMOSTAT

DWG. NO. 415303 – 10/17



1359

SR. OFFICER'S DECK (05)

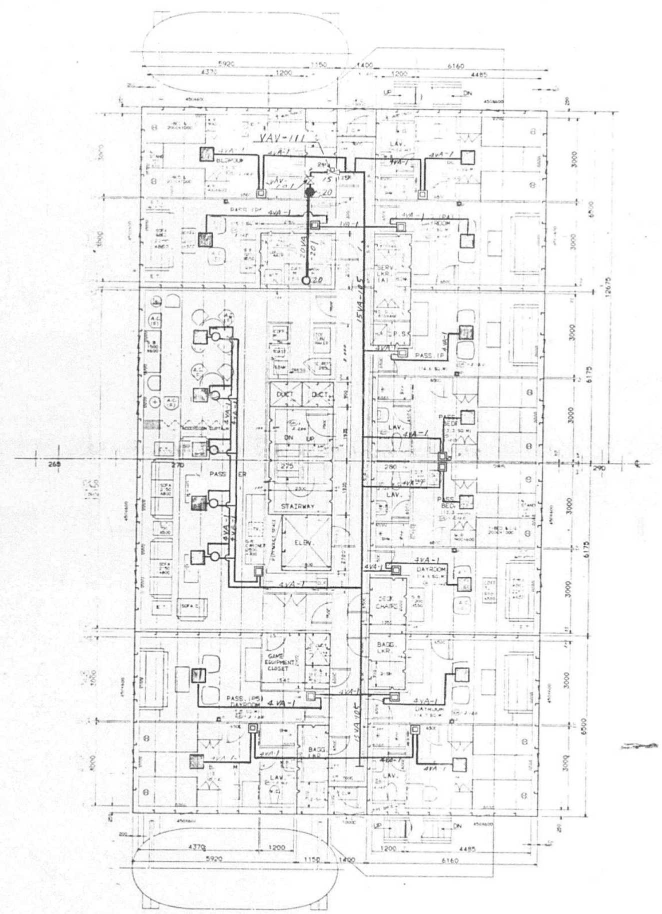


FR.SP. 770

DWG. NO. 411530 3 – 11/17

PASSENGER DECK (04)

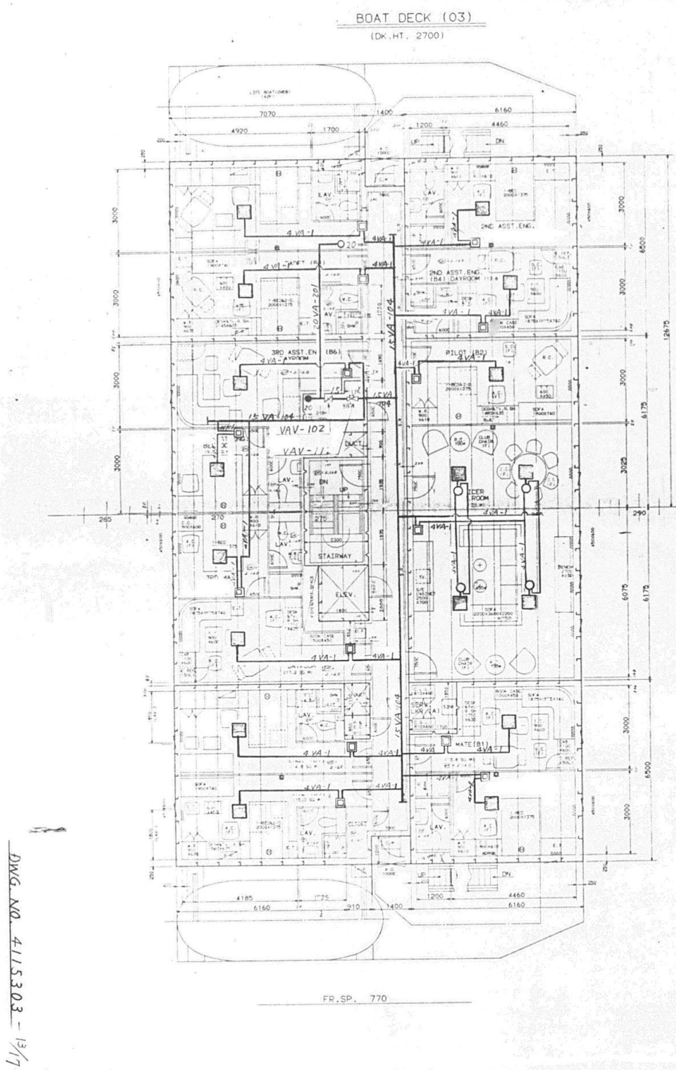
(DK.HT. 2700)

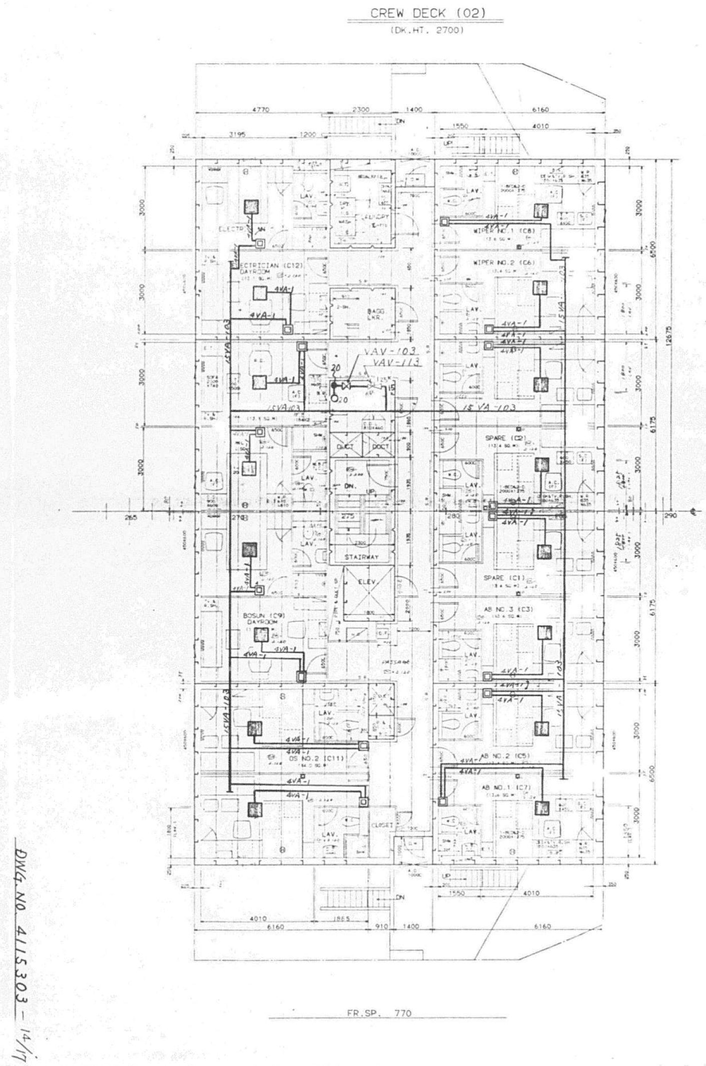


FR.SP. 770

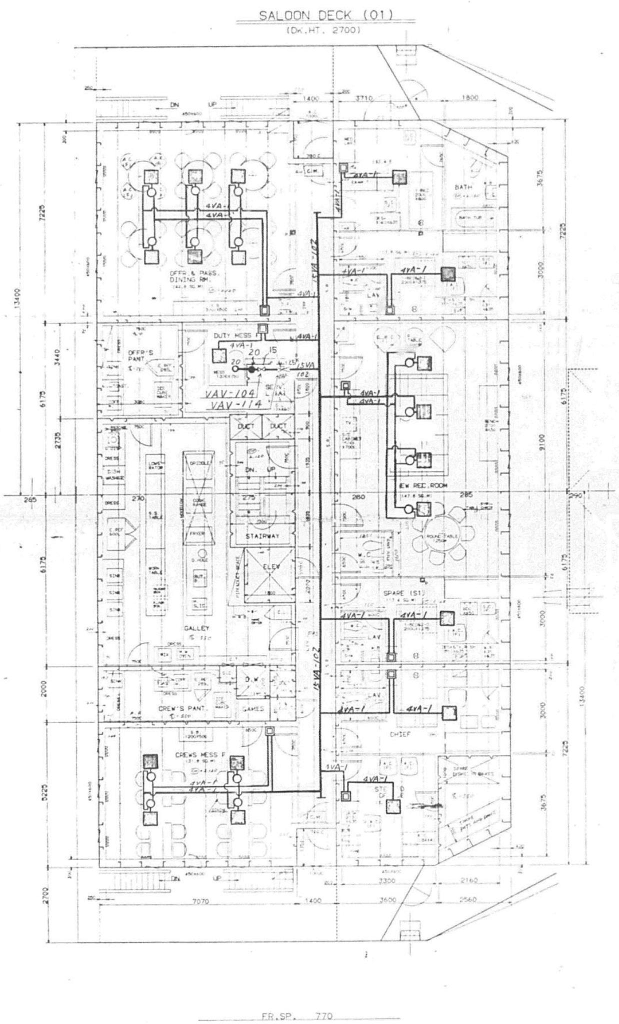
DWG. NO. 4115303 – 12/17

1360

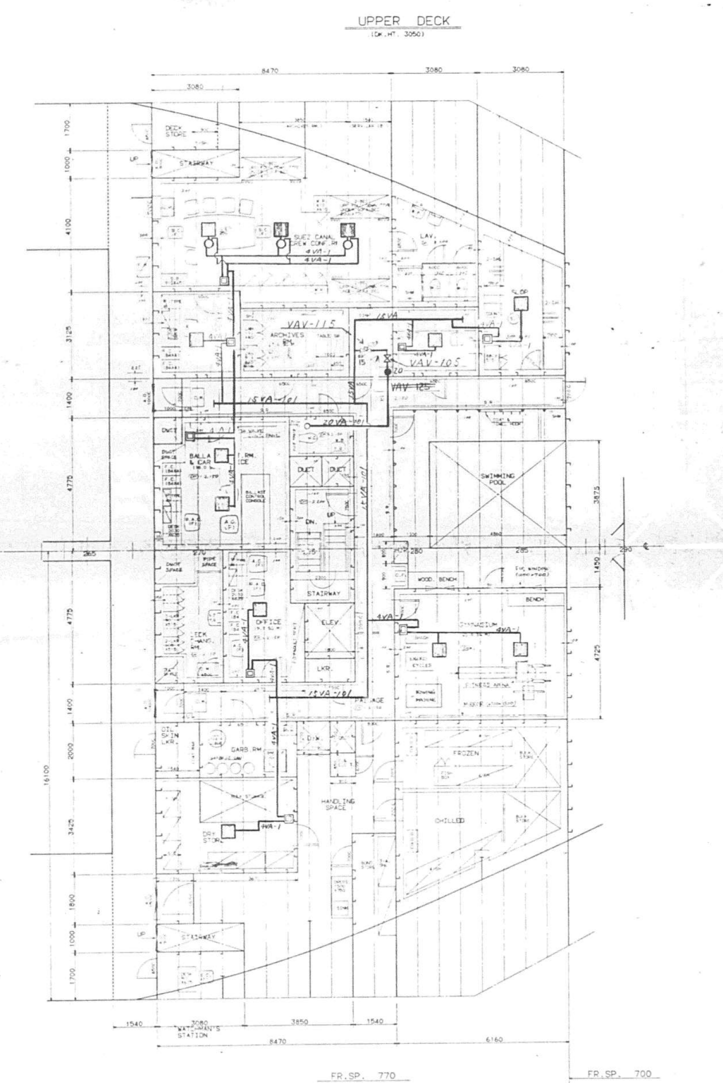

BOAT DECK (03)
(DK.HT. 2700)
FR.SP. 770
DWG NO 4115303 - 13/17


CREW DECK (02)
(DK.HT. 2700)
FR.SP. 770
DWG NO 4115303 - 14/17

1361

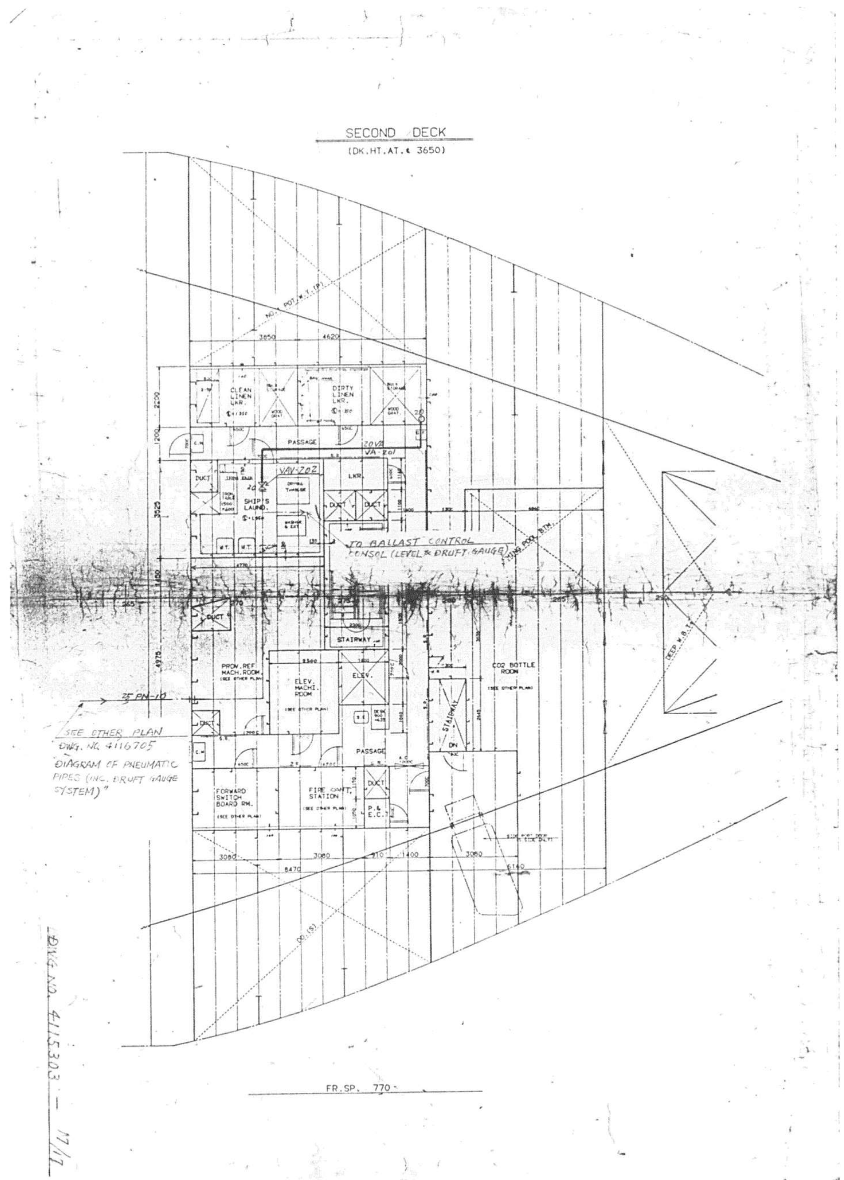


DWG. NO. 415303 - 15/17



DWG. NO. 415303 - 16/17

1362


SECOND DECK
(DK.HT.AT.℄ 3650)
CLEAN LINEN LKR.
DIRTY LINEN LKR.
PASSAGE
SHIP'S LAUND.
TO BALLAST CONTROL CONSOL (LEVEL & DRUFT GAUGE)
STAIRWAY
PROV. REF MACH. ROOM
ELEV. MACH. ROOM
ELEV.
CO2 BOTTLE ROOM
PASSAGE
FORWARD SWITCH BOARD RM.
FIRE CONT. STATION
DUCT
SEE OTHER PLAN DWG. NO. 4116705 "DIAGRAM OF PNEUMATIC PIPES (INC. DRUFT GAUGE SYSTEM)"
FR.SP. 770
DWG. NO. 4115303 — 17/17

1363

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	USCG DATE	USCG LETTER NO.
ORIGINAL			FEB.12'85	T-8-2		
REV. A	MAR.21'85	OFTS/MES -208	APR.22'85	T-8-2	JUN.12'85	M-00571
REV. B	JUN.10'85	OFTS/MES -527	JUL.12'85	T-8-2	AUG. 9'85	M-00782
REV. B1	NOV.15'85	OFTS/MES -1072	NOV.26'85	T-8-2	DEC.31'85	M-01252

FINISHED PLAN

TOTAL 36 SHEETS WITH COVER.

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. **1325** — SHIP'S NAME **TILLIE LYKES**

OUTFIT DESIGN SECT (PIPING)
SEC.CHIEF Yoshimura

ARRANG. OF ENG.ROOM & EMERG.GEN.ROOM INCLUDING FLOORING & VENT.AIR DUCTING

機関室　全体装置　及び
床板，格子，梯子装置，強圧通風路装置
（非常用発電機室配置図を含む）

DATE (TEL 2240)
JOB NO. — SCALE 1/100 — LYKES REF. NO. 400001 — MITSUI DRAWING NO. 5151001
JOBCLASSIF.NO.

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUN. 24 '86

DWG.NO. 5151001 2

TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES — LOCATION (FLOOR FORE)

NO.	SERVICE	TYPE	CAPACITY m^3/H	DIS. PRESS. kg/cm^2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	BILGE & BALLAST PUMP	EL. V. CENT. SELF-PRIM	500	2	-5	45	1800	1	
	BALLAST PUMP	EL. V. CENT. SELF-PRIM	500	2	-5	45	1800	1	
	HEELING PUMP	EL. V. CENT.	1000	2.5	0	100	1800	1	
	H.F.O. TRANSFER PUMP	EL. V. GEAR	50	3	-5	18.5	1200	2	
	D.O. TRANSFER PUMP	EL. H. GEAR	5	3	-5	1.5	1200	2	
	SHAFT GENERATOR	SEMI-ENCLOSED, DRIP-PROOF, 480 VOLTS, 3-PHASE	2000 KW	in a speed range 60 to 83 rpm				1	POWER FACTOR 0.8
	F.O. DRAIN TANK	SHIP'S STRUCTURE	40 m^3	FR 79 TO 83 IN DOUBLE BOTTOM			-		1

DWG.NO.5151001 - 3/

TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES — LOCATION (FLOOR STBD)

NO.	SERVICE	TYPE	CAPACITY m^3/H	DIS. PRESS. kg/cm^2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	FIRE & G.S. PUMP	EL. V. CENT. SELF-PRIM	175 / 265	11.2 / 2	0 / -5	65	1800	2	
	SLUDGE PUMP	EL. H. SNAKE	2	3	-5	1.5	1200	1	
	MAIN AIR COMPRESSOR	EL. VER. 2 STAGE, F.W. COOLED, RECIPRO.	300 Nm^3/H	30Kg/cm^2	-	75	900	3	
	TOPPING UP COMPRESSOR	"	132 Nm^3/H	30Kg/cm^2	-	37	900	1	
	BILGE PUMP	EL. H. RECIPRO.	5	3	-5	1.5	1200	1	
	BILGE SEPARATOR SERVICE PUMP	"	5	3	-5	1.5	1200	1	
	CAM SHAFT L.O. PUMP	EL. H. GEAR	12	4	-2	5.5	1200	2	
	BILGE SEPARATOR	AUTOMATIC DRAINAGE OF SEPARATED OIL	5	BELOW 15.ppm				1	USCG APPROVED TYPE
	CAM SHAFT L.O. COOLER	HOR. SHELL & STRAIGHT TUBE TYPE	8 m^2					1	
	STUFFING BOX L.O. DRAIN TANK		2.5 m^3	1.4 x 2.02 x 1.35				1	
	SCAVENGING BOX L.O. DRAIN TANK		0.2 m^3	0.6$^\phi$ x 0.85				1	
	CAM SHAFT L.O. TANK		0.75 m^3	1.25 x 1.45 x 1.05				1	
	WASTE O. TANK	SHIP'S STRUCTURE	15 m^3	FR 70 TO 78 IN DOUBLE BOTTOM				1	
	D.O. TANK (S)	"		FR 54 TO 79 IN DOUBLE BOTTOM				1	

DWG.NO.5151001 - 4/

1364

TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES LOCATION (FLOOR STBD)

NO.	SERVICE	TYPE	PARTICULAR					NO. OF REQ.	REMARKS
				SIZE m					
			CAPA-CITY m3/H	DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM		
	TURN. GEAR MOTOR STARTER	WALL MOUNT		0.45 x 0.26 x 0.55				1	
	BOTTOM L.O. SUMP TANK	SHIP'S STRUCTURE	41 m^3	FR 55 TO 76 IN DOUBLE BOTTOM				1	
	BOTTOM RESERVE L.O. TANK	"	"	FR 51 TO 77 IN DOUBLE BOTTOM				1	
	BALLAST EDUCTOR	WATER JET	60 m^3/H	DIS. HEAD: 10 M SUC. HEAD: -5 M				1	
	MAIN ENGINE	MITSUI B&W 9L80MCE	MCR: 28800PS at 83 RPM NSR: 25500PS at 79.7 RPM					1	
	BALLAST REMO - CON. POWER UNIT	WITH BLADDER ACCUMULATOR (32L x 2)	OIL TANK ... 120L MOTOR. PUMP ... 8-9L/min, 3-460V 3HP WORK.PRESS. ... 105 BAR					1	
	SOLENOID VALVE BOARD			1.4 x 0.5 x 2.05				1	
	TELEPHONE BOOTH			0.8 x 0.75 x 1.0				1	
	BILGE SEPARAT. SERVICE PUMP STARTER	WALL MOUNT		0.35 x 0.26 x 0.4				1	
	SEWAGE TRANSF. PUMP	EL. H. SNAKE	1	3	-5	0.75	1200	1	
	ENGINE ROOM SEWAGE HOLD TANK		8m^3	1.85x 2.1 x 2.25				1	
	SLUDGE PUMP STARTER	WALL MOUNT		0.35 x 0.25 x 0.4				1	
	SEWAGE TRANSF. PUMP STARTER	WALL MOUNT		0.35 x 0.26 x 0.4				1	

DWG.NO.5151001 -5/

TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES LOCATION (FLOOR STBD)

NO.	SERVICE	TYPE	PARTICULAR					NO. OF REQ.	REMARKS
				SIZE m					
			CAPA-CITY m3/H	DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM		
	P904 M/E TOOL PANEL			~~1.35~~ 0.9 x 0.33 x ~~[illegible]~~ 1.35				1	ENGINE MAKER SUPPLY
	P905 M/E TOOL PANEL			0.9 x 0.175 x 0.9				1	"
	SLID. DOOR REVERS. PANEL							1	DOOR MAKER SUPPLY
	OIL CONTENT METER FOR BILGE SEPARATOR			0.275 x 0.13 x 0.28				1	BILGE SEP. MAKER SUPPLY
	LIFT. BEAM FOR M/E. HEAVY SPARE PARTS		0.5 Ton	125 x 75 I				1	

DWG.NO.5151001 -6/

TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES LOCATION (FLOOR PORT)

NO.	SERVICE	TYPE	PARTICULAR					NO. OF REQ.	REMARKS
				SIZE m					
			CAPA-CITY m3/H	DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM		
	F.W. GEN. EJECTOR PUMP	EL. V. CENT	84m^3/H x T38 m			20	3600	1	
	MAIN COOL. S.W. PUMP	EL. V. CENT	490	1.5	0	30	1800	2	
		EL. V. CENT	490/325	1.5/0.65	0	30/11	1800/1200	1	
	AUX. COND. CIRC. PUMP	EL. V. CENT	800/600	0.8/0.45	0	30/15	1200/900	2	
	MAIN L.O. PUMP	EL. V. SCREW	550	4	-5	140	1200	2	
	FEED PUMP	EL. H. CENT	28	16	NPSH 5 m	37	3600	2	
	CONDENSATE PUMP	EL. V. CENT	15	3.5	720mmHg Vac.+1m	7.5	1800	2	
	L.O. PURIF. BOOSTER PUMP	EL. H. GEAR	5	1	-5	1.5	1200	1	
	L.O. TRANS. PUMP	EL. H. GEAR	5	3	-5	2.2	1200	1	
	BOILER W. CIRC. PUMP	EL. H. CENT	25	TOTAL HEAD 45 m	8 atg	7.5	3600	2	
	AIR COOLER CHEMICAL CLEAN. PUMP	EL. H. CENT SELF-PRIM	10	1.5	-5	2.2	3600	1	
	MAIN L.O. COOLER	PLATE TYPE AX 30 FM	210m^2	51°c → 45°c				2	
	CLEAN DRAIN TANK	SHIP'S STRUCTURE	5 m^3	FR 54 TO 62 IN DOUBLE BOTTOM				1	
	D.O. TANK (P)	SHIP'S STRUCTURE		FR 66 TO 71 IN DOUBLE BOTTOM				1	
	AIR COOLER CLEAN W. TANK		1.5 m^3	1.6 x 1.1 x 1.0				1	

DWG.NO.5151001 -7/

TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES LOCATION (FLOOR PORT)

NO.	SERVICE	TYPE	PARTICULAR					NO. OF REQ.	REMARKS
				SIZE m					
			CAPA-CITY m3/H	DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM		
	L.O. DRAIN TANK		0.5 m^3	1.0 x 0.9 x 0.75				1	
	FILTER L.O. DRAIN TANK		60 L	0.4ø x 0.7				1	FILTER MAKER SUPPLY
	L.O. PURIF. BOOSTER PUMP AND L.O.TRANSF PUMP G.S.P.	WALL MOUNT		0.6 x 0.45 x 1.4				1	
	AIR COOLER CHEM.CLEAN. PUMP STARTER	WALL MOUNT		0.35 x 0.26 x 0.4				1	

DWG.NO.5151001 -8/

TS1323/4/5 IN SHAFT TUNNEL

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (SHAFT TUNNEL)

NO.	SERVICE	TYPE	PARTICULAR CAPACITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	STERN TUBE L.O. PUMP	EL. H. GEAR	2	2.5	-5	0.75	1200	2	
	STERN TUBE L.O. COOLER	HOR. SHELL & STRAIGHT TUBE TYPE	$2.5m^2$					1	
	STERN TUBE L.O. DRAIN TANK	SHIP'S STRUCTURE	$2m^3$	FR 29 TO 34 IN DOUBLE BOTTOM				1	
	STERN TUBE SEAL O. TANK		$0.01 m^3$		0.35φ x 0.6			1	
	BILGE TANK	SHIP'S STRUCTURE	$45 m^3$	FR 44 TO 50 IN DOUBLE BOTTOM				1	
	W.T. PROTECTION BOX OF ANODE				.3506 x 1,200			2	
	W.T. PROTECTION BOX OF REF. ELECTRODE				.3506 x 1,200			1	
	AUTOMATIC POWER SUPPLY PANEL				0.7 x 0.52 x 1.05			1	MAKER SUPPLY
	INTERMEDIATE SHAFT BEARING	F.W. COOLED						3	
	LIFT. BEAM FOR SHAFT DISMOUNT.		~~25~~ 30 tons	~~330~~ 400 x 1501				1	

DWG. NO. 5151001 -9/

TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (UNDER 3RD DK. FORE)

NO.	SERVICE	TYPE	PARTICULAR CAPACITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	H. F.O. SLUDGE TANK	SHIP'S STRUCTURE	m^3	FR 78 TO 80 UNDER 3RD. DECK				1	
	L.O. SLUDGE TANK	SHIP'S STRUCTURE	$2 m^3$	FR 80 TO 82 UNDER 3RD. DECK				1	
	D.O. SLUDGE TANK	SHIP'S STRUCTURE	$1 m^3$	FR 78 TO 80 UNDER 3RD. DECK				1	

DWG. NO. 5151001 -10/

TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (UNDER 3RD DK. PORT)

NO.	SERVICE	TYPE	PARTICULAR CAPACITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	AUX. CONDENSER	HOR. SHEEL & STRAIGHT TUBE TYPE	$170 m^2$					1	
	LIFT. BEAM FOR MAIN L.O. PUMP		1 Ton	150 × 75 I				1	
	LIFT. BEAM FOR AUX. COND. CIRC. PUMP		0.5 Ton	125 × 75 I				1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (3RD DK. FORE)

NO.	SERVICE	TYPE	PARTICULAR CAPACITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	F.O. CIRC. PUMP	EL. H. GEAR	11	10	30	5.5	1200	2	
	F.O. BOOSTER PUMP	EL. H. GEAR	6	4	0	2.2	1200	2	
	F.O. PURIF. FEED PUMP	EL. H. GEAR	4.5 / 2.3	4	-5	2.2 / 1.1	1200 / 600	2	
	H.F.O. PURIFIER	EL. CENT. SELF-CLEAN, PARTIAL DISCHARGE WITH WATER SENSER	4410 L/H			15	1800	2	
	D.O. PURIFIER	EL. CENT SELF-CLEAN	3650 L/H			7.5	1800	1	
	L.O. PURIFIER	EL. CENT SELF-CLEAN	4200 L/H			11	1800	2	
	L.O. PURIFIER (SMALL)	EL. CENT SELF-CLEAN	800 L/H			2.2	1800	1	
	F.O. FILTRATOR UNIT	AUTOMATIC CLEANING MODEL 8.12-250	4500 L/H	0.9 x 1.2 x 2.38				1	
	F.O. BLENDING UNIT	DYNAMIC MIXING	APPROX. 700 L/H					1	
	BOILER F.O. BURN. PUMP	EL. H. SCREW	1.1	16	-3	3.7	1200	2	
	PURIF. F.O. HEATER	HOR. STEAM HEATING	4410 L/H	50°→ 110°C				2	
	PURIF. L.O. HEATER	HOR. STEAM HEATING	4200 L/H	45°→ 80°C				2	
	BOILER F.O. HEATER	HOR. STEAM HEATING	1100 L/H	55°→ 125°C				1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES — LOCATION (3RD DK. FORE)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	AUX. L.O. PURIF. OPERAT. W. TANK		50L	0.4 x 0.45 x 0.625				1	
	L.O. & D.O. PURIF. OPERATING W. TANK		50L	0.4 x 0.45 x 0.625				1	
	BOWL CLEAN TABLE			1.1 x 0.6 x 0.8				1	
	BLEND O. UNIT PANEL			0.41 x 0.28 x 0.6				1	MAKER SUPPLY
	3RD DK PORT G.S.P.			1.0 x 0.45 x 2.4				1	
	L.O. FINE FILTER	CARTRIDGE FILTER	100 L/H					2	
	FILTER L.O. PUMP	EL. H. GEAR	0.1	3	-5	0.2	1200	1	
	M/E STUFF BOX L.O. TANK		3 m3	1.4 x 1.4 x 1.85				1	
	H.F.O. SERV. TANK	SHIP'S STRUCTURE	115 m3	FR 78 TO 83 ABOVE 3RD. DECK				1	
	H.F.O. SETT. TANK (S)	SHIP'S STRUCTURE	115 m3	FR 78 TO 83 ABOVE 3RD. DECK				1	
	H.F.O. SETT. TANK (P)	SHIP'S STRUCTURE	115 m3	FR78 TO 83 ABOVE 3RD. DECK				1	
	H.F.O. PURIFIER CONTROL PANEL	MARST1x2 EPC30 x2		0.48 x 0.15 x 0.24				4	MAKER SUPPLY
	D.O. PURIFIER CONTROL PANEL	EPC30		0.48 x 0.15 x 0.24				1	"
	L.O. PURIFIER CONTROL PANEL	EPC30		0.48 x 0.15 x 0.24				2	"
	AUX. L.O. PURIFIER EMERGENCY ALARM BOX	AE-1		0.3 x 0.18 x 0.4				1	"

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES — LOCATION (3RD DK. FORE)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	LIFT. BEAM FOR SHAFT GEN. DIS-MOUNTING		25tons	350 x 150 I				1	
	LIFT BEAM FOR PURIFIERS		0.5ton	125 x 75 I				3	
	CONTROL BOX FOR FILTRATOR			0.8 x 0.3 x 1.0				1	FILTRATOR MAKER SUPPLY

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES — LOCATION (3RD DK. STBD)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	MAIN ENGINE F.O. DISCHARGE FILTER	AUTOMATIC CLEANING	11	50 microns				1	
	MAIN ENGINE F.O. HEATER	HOR. STEAM HEATING	5500 L/H	125°→150°C				3	
	SYNC. CONDENSER							1	SIEMENS SUPPLY
	S.C.R.			4.8 x 1.2 x2.34				1	"
	TELEPHONE BOOTH			0.8 x 0.75 x 1.0				1	
	3RD.DK.STBD. G.S.P.			1.2x 0.45 x 2.0				1	
	F.W. HYDROPHONE UNIT	VER. TANK WITH TWO PUMPS (EL. V. CENT.)	TANK 1 m3 PUMP 5 m3/H x T 50 m x 2 SETS MOTOR 3.7 KW x 3600 RPM					1	
	CONTROL AIR COMPRESSOR	EL. HOR. OIL FREE, CENTRIFUGAL, WATER DISPLACEMENT	160 Nm3/H	7kg/cm2		37	1800	1	
	SHIP SERVICE AIR COMPRESSOR	EL. VENT. AIR COOL RECIPRO	300 Nm3/H	9kg/cm2		37	1800	1	
	CONTROL AIR DEHYDRTOR	EL. REFRIGERATION	100 Nm3/H	7kg/cm2		—	—	1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES — LOCATION (3RD DK. STBD)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	MAIN AIR RESERVOIR	CYLIND.	23.5 m3	30kg/cm2				2	
	CONTROL AIR RESERVOIR	CYLIND.	3 m3	7kg/cm2				1	
	SHIP SERVICE AIR RESERVOIR	CYLIND.	3 m3	9kg/cm2				1	
	M/E VALVE BOX			1.15 x 0.4 x 0.8				1	ENGINE MAKER SUPPLY
	P906 M/E TOOL PANEL			~~1.8~~ 0.9 x 0.38 x ~~0.9~~ 1.8				1	"
	F.W. TRANSF. PUMP	EL.V.CENT.	15	2	0	2.2	3600	1	
	STERILIZER	ULTRA VIOLET	Abt. 1.8					1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (3RD DK. PORT)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m³/H	DIS. PRESS. kg/cm²	SIZE m SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	F.W. GENERATOR	FLASH TYPE WITH STEAM INJECT.	35 T/D					1	
	HIGH TEMP. COOL. F.W. PUMP	EL. V. CENT	175	2.8	S10	15	1800	2	
	LOW TEMP. COOL. F.W. PUMP	EL. V. CENT	450	3.3	S15	37	1800	3	
	DRAIN COOLER	HOR. SHELL & STRAIGHT TUBE TYPE	2 m²					1	
	ATMOS. DRAIN TANK		3 m³	1.75 x 1.3 x 1.6				1	
	TELEPHONE BOOTH			0.8 x 0.75 x 1.0				1	
	TURBO-GENERATOR	HOR. MULTI-STAGE, REDUCTION GEAR COUPLED, MIXED PRESSURE, CONDENSING TYPE	800 KW	A.C. 480V, 3-PHASE 1800rpm, 60 Hz				1	POWER FACTOR 0.8
	T/GEN. PRIM. L.O. PUMP	EL. H. GEAR	3	6	-5	2.2	1200	1	INSTALLED ON T/GEN. FOUNDATION
	VACUUM PUMP UNIT	EL. H. ELMO WITH 2 pumps	1.2Kg/H	MAX. 720 mmHg		5.5	1800	1	
	T/GEN. L.O. STOR. TANK		1 m³	1.0 x 1.0 x 1.25				1	
	T/GEN. L.O. RENOVAT. TANK		1 m³	1.0 x 1.0 x 1.25				1	
	M/ENG. F.W. PRE-HEATER	HOL. STEAM HEATING	35	60°C → 70°C				1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (3RD DK. PORT)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m³/H	DIS. PRESS. kg/cm²	SIZE m SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	M/ENG. L.O. DISCHARGE FILTER	AUTOMATIC CLEANING	550	50 microns				1	
	WASTE O. SERVICE TANK		0.5 m³	0.6 x 1.0 x 1.1				1	
	WASTE O. BURN. PUMP	EL. H. SNAKE	1.1	12	0	1.5	1200	1	BOILER MAKER SUPPLY
	PILOT BURNER PUMP	EL. H. GEAR	24Kg/H	16 (10~15)		0.4	1800	1	BOILER MAKER SUPPLY
	AUX. BOILER	MARINE VERT FULL AUTO-MATIC BURNING, CAPABLE WASTE OIL BURNING	8500 Kg/H	11atg set.				1	
	SOOT CLEAN W. TANK	SHIP'S STRUCTURE	20 m³	FR 54 TO 62 ABOVE 3RD.DECK				1	
	CENTRAL F.W. COOLER	PLATE TYPE AX 30 FM	210m²	51°c → 36.5°c				2	
	AUX. BOILER ~~CONTROL PANEL~~ G.S.P.			1.2 × 0.42 × 1.8				1	BOILER MAKER SUPPLY
	SLUDGE GRINDER PUMP	EL. H. SCREW	1.5	0.5		3.7	3600	1	BOILER MAKER SUPPLY
	BURNER CONTROL PANEL			0.7 × 0.42 × 1.8				1	BOILER MAKER SUPPLY
	M/E. L.O. DIS. FILTER CONTROL BOX	WALL MOUNT.		0.52 × 0.2 × 0.45				1	FILTER MAKER SUPPLY
	M/E. L.O. DIS. FILTER GAUGE BOARD	WALL MOUNT.		0.3 × 0.09 × 0.4				1	FILTER MAKER SUPPLY
	T/GEN. GLAND CONDENSER	SHELL TUBE WITH FAN	1.5 m²	SUC.VAC: 100mmAq DEL.PRESS: 50mmAq		0.75	3400	1	T/GEN. MAKER SUPPLY
	T/GEN. CONTROL PANEL							1	T/GEN. MAKER SUPPLY
	T/GEN. GLAND COND. STARTER			0.35 × 0.26 × 0.5				1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (2ND DK. STBD)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m³/H	DIS. PRESS. kg/cm²	SIZE m SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	NO.2 POTABLE W. TANK	SHIP'S STRUCTURE	100 m³	FR 58 TO 69 ABOVE 2ND DECK				1	
	WASH BASIN (WITH MIRROR)							1	
	COLD WATER FOUNDAION	WITHOUT STERILIZER						1	
	SYL. O. MEASERING TANK		0.8 m³	1.2 x 0.6 x 1.4				1	
	EXH. V. GRIND. MACINE		1100 kg	MAX. 1.32 x 0.8 x 2.0				1	ENGINE MAKER SUPPLY
	EXH. V. OVERHAUL STAND		628 kg	2.012 x 1.1 x 2.275				1	"
	SPARE CYL. LINER		4000 kg					1	"
	SPARE CYL. COVER		4023 kg					1	"
	TRANSFORMER			0.81 x 0.35 x 0.44				1	
	H.F.O.PURIF. OPERATING W. TANK		50L	0.4 x 0.45 x 0.625				1	
	P901 M/E. TOOL PANEL			~~1.8~~ 0.9 x 0.23 x ~~0.9~~ 1.8				1	ENGINE MAKER SUPPLY
	P902-1 M/E. TOOL PANEL			~~1.35~~ 0.9 x 0.235 x ~~0.9~~ 1.35				1	"
	P902-2 M/E. TOOL PANEL			~~1.35~~ 0.9 x 0.43 x ~~0.9~~ 1.35				1	"
	P908 M/E. TOOL PANEL			0.9 x 0.19 x 0.9				1	"
	P909 M/E. TOOL PANEL			~~1.8~~ 0.9 x 0.18 x ~~0.9~~ 1.8				1	"

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (2ND DK. STBD)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m³/H	DIS. PRESS. kg/cm²	SIZE m SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	ENG. RM. LT. DIST. BOARD	WALL MOUNT			0.4 x 0.2 x 1.0			1	
	OVERHEAD CRANE SWITCH BOX				0.35 × 0.17 × 0.3			1	CRANE MAKER SUPPLY

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (2ND DK. PORT)

NO.	SERVICE	TYPE	CAPA-CITY m^3/H	DIS. PRESS. kg/cm^2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
			PARTICULAR (SIZE m)						
	SPAPRE EXH. VALVE		1860 kg					3	ENGINE MAKER SUPPLY
	G/E. L.O. SETT. TANK		1.2 m^3		0.8 x 1.2 x 1.91			1	
	G/E. L.O. STOR. TANK		4.5 m^3		2.4 x 1.2 x 1.91			1	
	DIESEL GENERATOR	4 STROKE CYCLE. SINGLE ACTING, SOLID INJECT, TRUNK PISTON, TURBOCHARGED	1170 PS at 720 RPM (800 KW)	A.C. 480 V, 3-PHASE, 60 Hz				3	
	D/G L.O. PRIM. PUMP	EL. H. GEAR	3	3.5	-5	1.5	1200	3	
	D/G L.O. PRIM. PUMP G.S.P.				0.6 x 0.45 x 1.8			1	
	T/C FILTER CLEAN TUB				1.3 x 0.95 x 0.6			1	
	D/G L.O. BYPASS FILTER	CARTRIDGE FILTER	100 L/H					3	
	TELEPHONE BOOTH				0.8 x 0.75 x 1.0			1	
	ECO. CLEAN W. COLLECT TUB		ABOUT ~~1.5~~ m^3 0.9		~~3.40 x 0.8 x 0.69~~ 1.8 x 1.0 x 0.5			1	
	D.O. SETT. TANK	SHIP'S STRUCTURE	20 m^3		FR 70 TO 74 ABPVE 2ND DECK			1	
	DIST. WATER TANK	"	22 m^3		FR 54 TO 58 ABOVE 2ND DECK			1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (2ND DK. PORT)

NO.	SERVICE	TYPE	CAPA-CITY m^3/H	DIS. PRESS. kg/cm^2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
			PARTICULAR (SIZE m)						
	M/E L.O. STOR. TANK	SHIP'S STRUCTURE	41 m^3		FR 62 TO 66 ABOVE 2ND DECK			1	
	BLEND. F.O. HEATER	HOR. STEAM HEATING	1680L/H	100° → 135°C				1	
	BOILER D.O. TANK		1.6 m^3		1.0 x 1.5 x 1.4			1	
	ENG. RM. LT. DIST. BOARD	WALL MOUNT			0.4 x 0.2 x 1.0			1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (PART DK. STBD)

NO.	SERVICE	TYPE	CAPA-CITY m^3/H	DIS. PRESS. kg/cm^2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
			PARTICULAR (SIZE m)						
	HIGH PRESS. WASH DOWN UNIT		40 L/min.	70 Bar	SPACE 2.5 x 1.0 x 2.0			1	
	ENGINE ROOM EXH. FAN	EL. VER. AXIAL	200 Nm3/min, 20 mmAq			2.2	3600	2	
	SPARE PISTON WITH ROD		2790 kg					1	ENGINE MAKER SUPPLY
	OVERHEAD CRANE	EL. MOTOR DRIVEN (HOIST, TRAVEL, TRAVERSE)	7 tons					1	
	CALORIFIER	STEAM HEAT.	100L					1	
	ENGINE ROOM FAN G.S.P.				~~1.2~~ 0.6 x 0.45 x 2.3			1	
	F.O. MIXING CHAMBER		230L (300L)		~~450ϕ~~ 400ϕ x 2.7			1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (UNDER UPP. DK. PORT)

NO.	SERVICE	TYPE	CAPA-CITY m^3/H	DIS. PRESS. kg/cm^2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
			PARTICULAR (SIZE m)						
	ENGINE ROOM EXH. FAN	EL. VER. AXIAL	200 Nm3/min, 20 mmAq,			2.2 KW,	3600 RPM	1	
	PURIFIER SPACE EXH. FAN	EL. VER. AXIAL	100 Nm3/min, 25 mmAq,			1.5 KW,	3600 RPM	1	
	~~F.V. WORKSHOP EXH. FAN~~	~~EL. VER. AXIAL~~	~~20 Nm3/min, 20 mmAq,~~			~~0.2 KW,~~	~~1800 RPM~~	~~1~~	
	BOW THRUSTER TRANS & STARTER				4 x 1.5 x 2.3			1	
	CARGO HOLD FAN G.S.P.				4.9 x 0.45 x 2.3			1	
	F.W. DEAERATION TANK		300 m^3/H		500ϕ			1	
	STERN TUBE L.O. HEAD TANK		0.2 m^3		0.85 x 0.7 x 0.85			1	
	D.O. SERVICE TANK	SHIP'S STRUCTURE	20 m^3		FR 70 TO 74 ABOVE PART DECK			1	
	LIFT BEAM FOR D/ GEN.		0.5 tons		125 x 75 I			~~4~~ 3	
	LIFT BEAM FOR T/GEN.		2 tons		200 x 125 I			1	

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TS1323/4/5 IN ENGINE ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (UPP. DK.)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	EXH. GAS ECONOMIZER	BENT BARE AND FINNED TUBE, FORCED CIRCULATION, WITH SUPER-HEATER & PREHEATER	4860 kg/h AT NSR OF M/ENG. IN SUMMER					1	
	F.W. EXPANSION TANK		1 m3	1.0 x 1.2 x ~~1.05~~ 1.25				1	
	D/GEN. EXH. GAS SILENCER							3	D/GEN. MAKER SUPPLY
	FLASHER			1000ℓ				1	
	ENG. ROOM SUPPLY FAN (REVERSIBLE)		1000/750 Nm3/min	35/20 mmAq		KW 15/7.5	1200/900 RPM	2	
	ENG. ROOM SUPPLY FAN		1000/750	35/20		15/7.5	1200/900	2	
	SUPPERHEATER TUBE SPARE							1	
	ECONOMIZER TUBE SPARE							2	
	PRE-ECONOMIZER TUBE SPARE							2	—
	SOOT BLOWER SEQUENCE CONTROL BOX							1	
	FLOOD LT. & PORTABLE FLOOD LT. DIST. BOARD	WALL MOUNT		0.4 x 0.2 x 1.0				1	
	LIFT. BEAM FOR SPARE ECO. TUBE		¼ ton 3	~~150 x 75 I~~ 250 x 125 I				1 set	
	BLEND O. DEAERATION CHAMBER		200 L	400φ x 1.8				1	
	~~PEDESTAL CRANE STARTER PANEL~~	WALL MOUNT		~~0.7 x 0.26 x 1.8~~				~~1~~	

DWG. NO. 5151001-25/

TS1323/4/5 IN EMERG. GEN. ROOM

PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (EMERG. GEN. ROOM)

NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	EMERG. GENERATOR	4 STROKE-CYCLE, SINGLE ACTING SOLID INJECT, TRUNK PISTON	210 KW at 1800 RPM AC 480V, 3 PHASE, 60 HZ					1	POWER FACTOR 0.8
	EMERG. GEN. F.O. TANK		0.95 m3	1.1 x 0.7 x 1.45				1	
	AUX. AIR RESERVOIR		0.15 m3	30 kg/cm2				1	
	EMERG. AIR COMPRESSOR	DIESEL ENGINE DRIVEN, VER. 2 STAGE, AIR COOLED, RECIPRO.	5 Nm3/H	30 kg/cm2		3.5 PS	2000	1	
	TELEPHONE BOOTH			0.8 x 0.75 x 1.8				1	
	EMERG. SWITCH BOARD			2.5 x 0.6 x 2.3				1	
	EMERG. LT. DIST. BOARD			0.4 x 0.2 x 1.0				1	
	BATTERY CHARGER			0.7 x 0.3 x 1.0				1	
	BATTERY		24V x 20A	0.9 x 0.45 x 0.4				1	
	TRANSFORMER			0.81 x 0.35 x 0.44				1	
	EMERG. GEN. COOL. W. HEATER SWITCH BOX	WALL MOUNT		0.25 x 0.13 x 0.26				1	EMERG. GEN. MAKER SUPPLY
	EMERG. GEN. AUTO START PANEL	WALL MOUNT		0.45 x 0.18 x 0.6				1	EMERG. GEN. MAKER SUPPLY
	DECK CRANE STARTER PANEL	WALL MOUNT		0.7 x 0.26 x 1.8				1	CRANE MAKER SUPPLY
	NO. 1 ENG. RM. SUPPLY FAN STARTER	WALL MOUNT		0.6 x 0.26 x 1.13				1	

DWG. NO. 5151001-26/

TS1323/4/5 IN FIRE EQUIPMENT ROOM

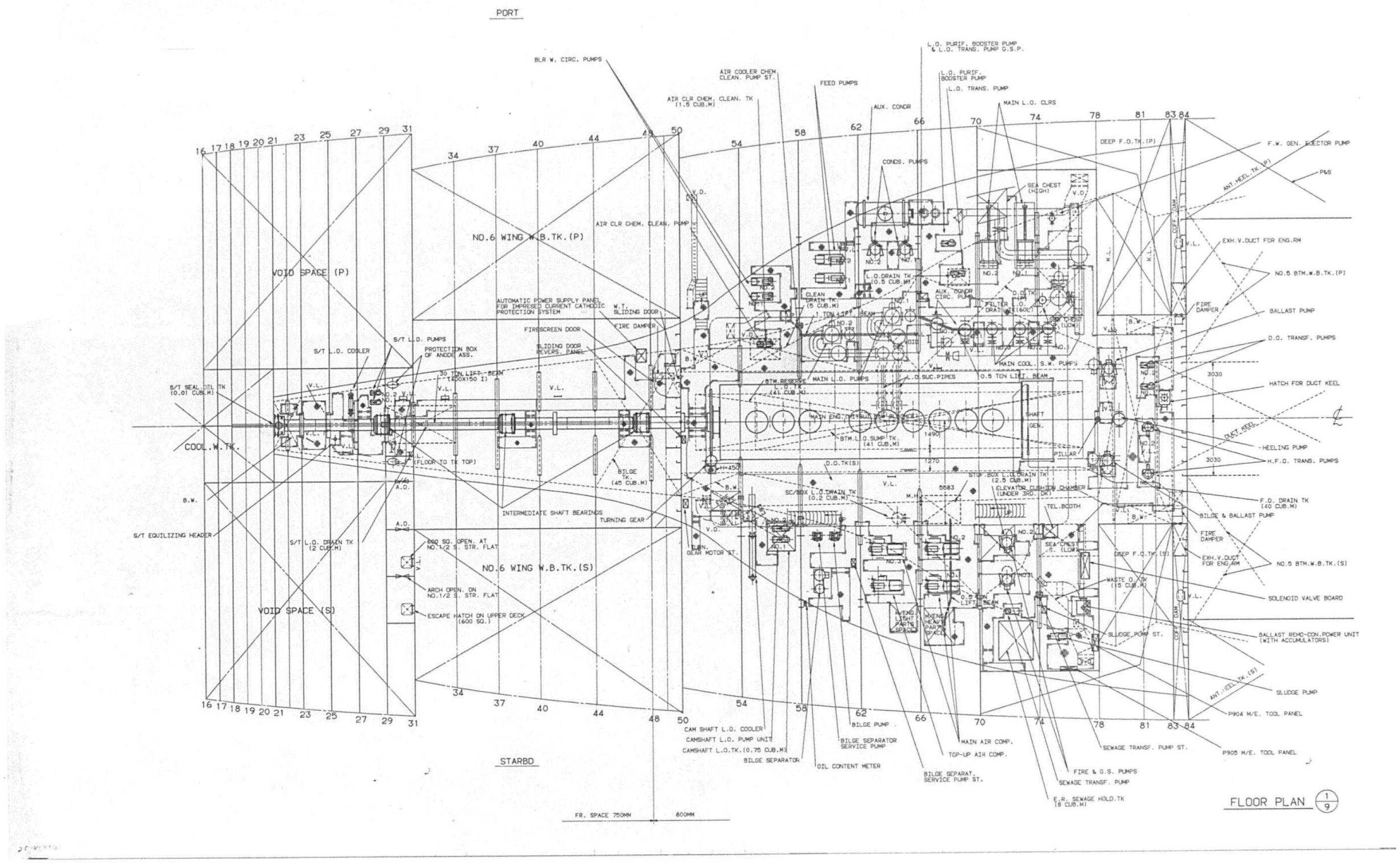
PRINCIPAL PARTICULARS OF MACHINERIES

LOCATION (UPPER DECK)

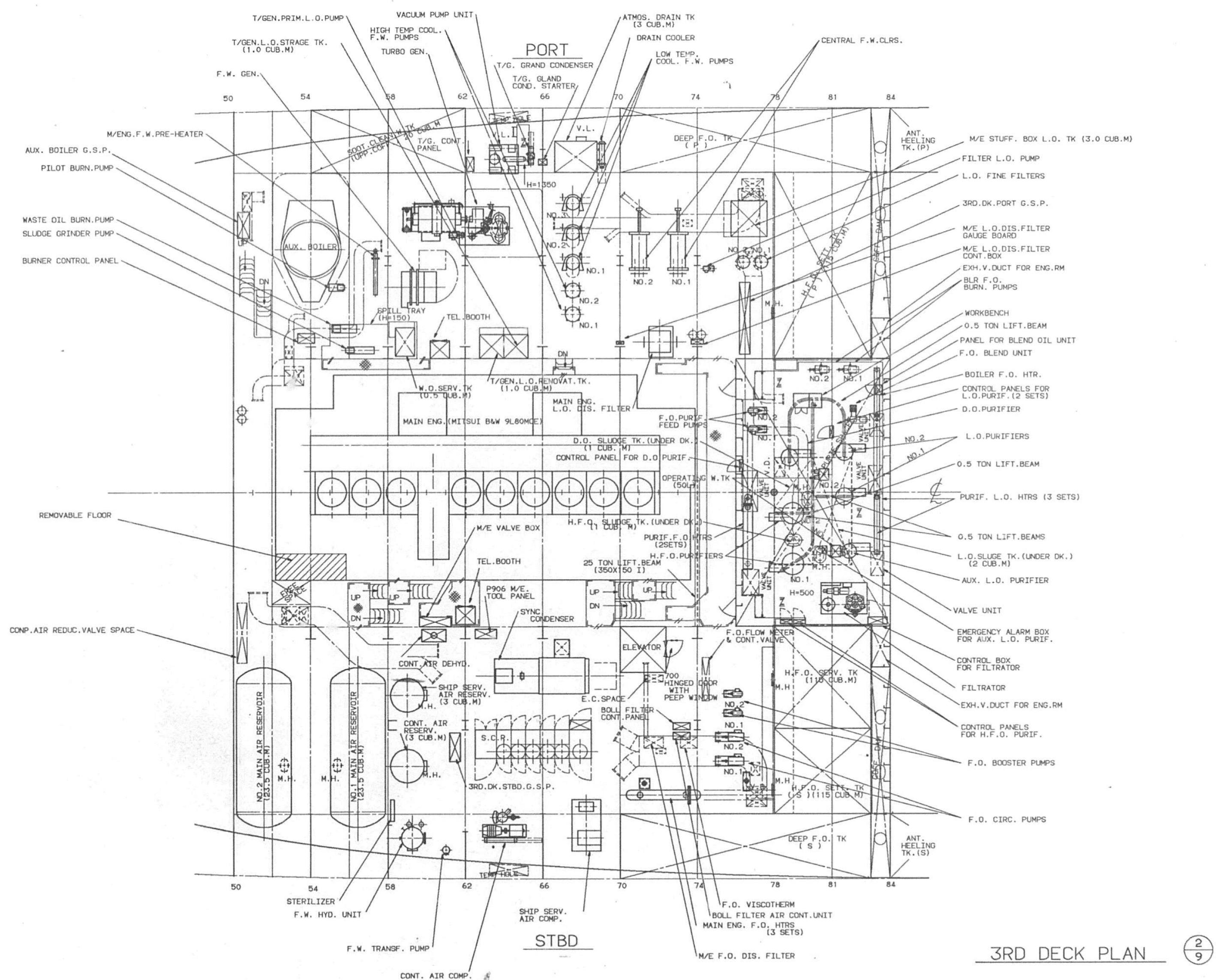
NO.	SERVICE	TYPE	PARTICULAR CAPA-CITY m3/H	SIZE m DIS. PRESS. kg/cm2	SUC. HEAD m	MOTOR KW	MOTOR RPM	NO. OF REQ.	REMARKS
	CO_2 RELEASE BOX FOR ENG. ROOM							1	
	SLIDING DOOR REMOTE HAND PUMP	WITH HINGED HANDLE		228.6φ				1	DOOR MAKER SUPPLY
	SLIDING DOOR EXPANSION TANK		2 Gal.	0.229 x 0.106 x 0.416				1	DOOR MAKER SUPPLY
	SLIDING DOOR MECHANICAL INDICATOR	OPEN↔CLOSE		95.3φ				1	DOOR MAKER SUPPLY
	F.O. & L.O. TKS EMERG. SHUT-OFF PANEL							1	
	EMERGENCY AIR RESERVOIR	CYLIND.	0.2 m3	9 kg/cm2		500φ x 1126		1	
	SEA VALVES CONTROL PANEL	WITH SOLENOID VALVES		0.8 x 0.6 x 1.6				1	
	SPARE DRY CHEMICAL								
	SPARE ~~CO_2 BOTTLE~~ FIRE EXTINGUISHER							6	
	FIRE BUCKET							1	
	FIREMAN'S FITTINGS							1 set	
	FIRE CONTROL PANEL			0.35 x 0.25 x 0.4				1	

DWG. NO. 5151001-27/

1370

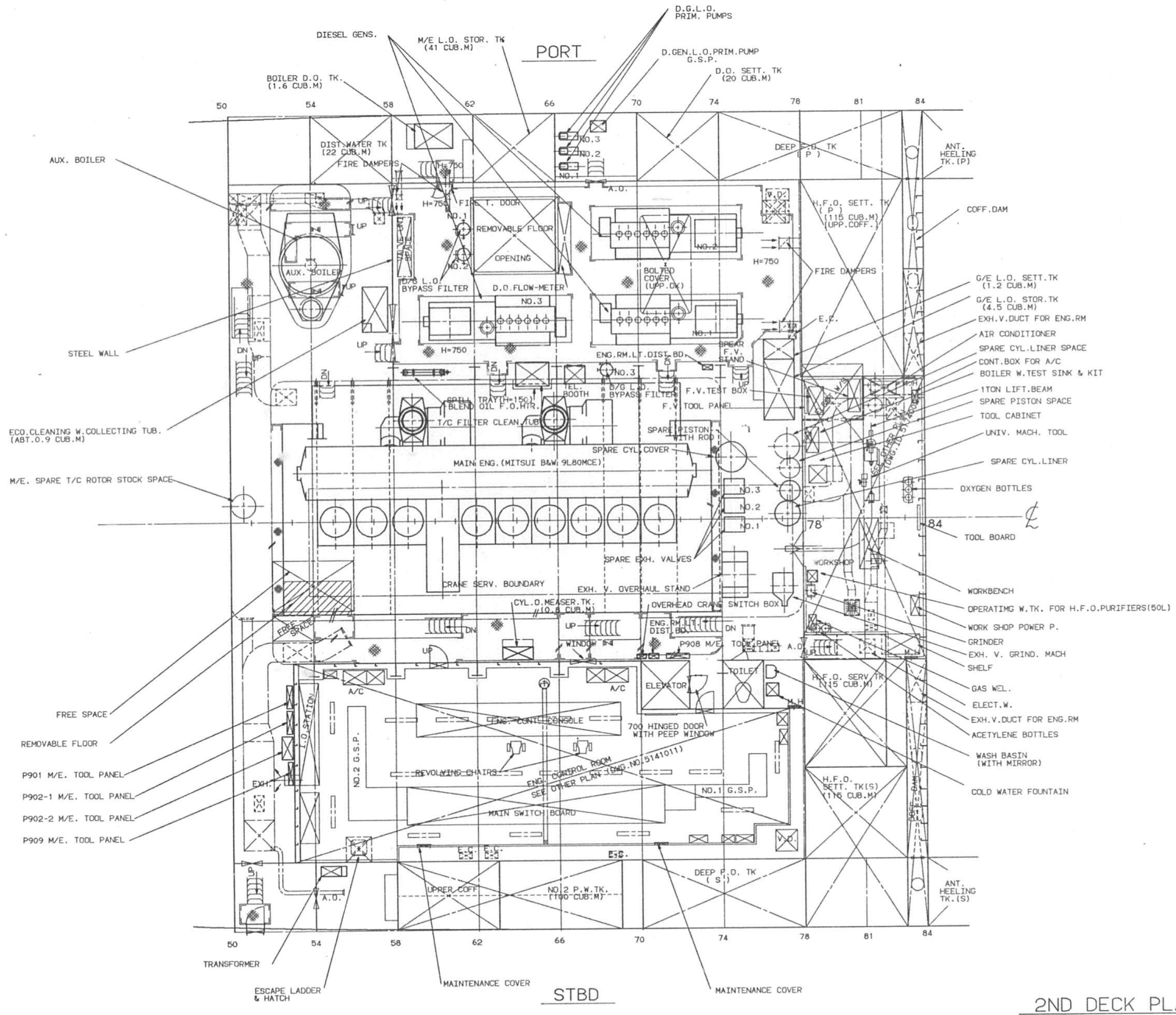

PORT
STARBD
NO.6 WING W.B.TK.(P)
NO.6 WING W.B.TK.(S)
VOID SPACE (P)
VOID SPACE (S)
COOL.W.TK.
FLOOR PLAN

1371



3RD DECK PLAN (2/9)

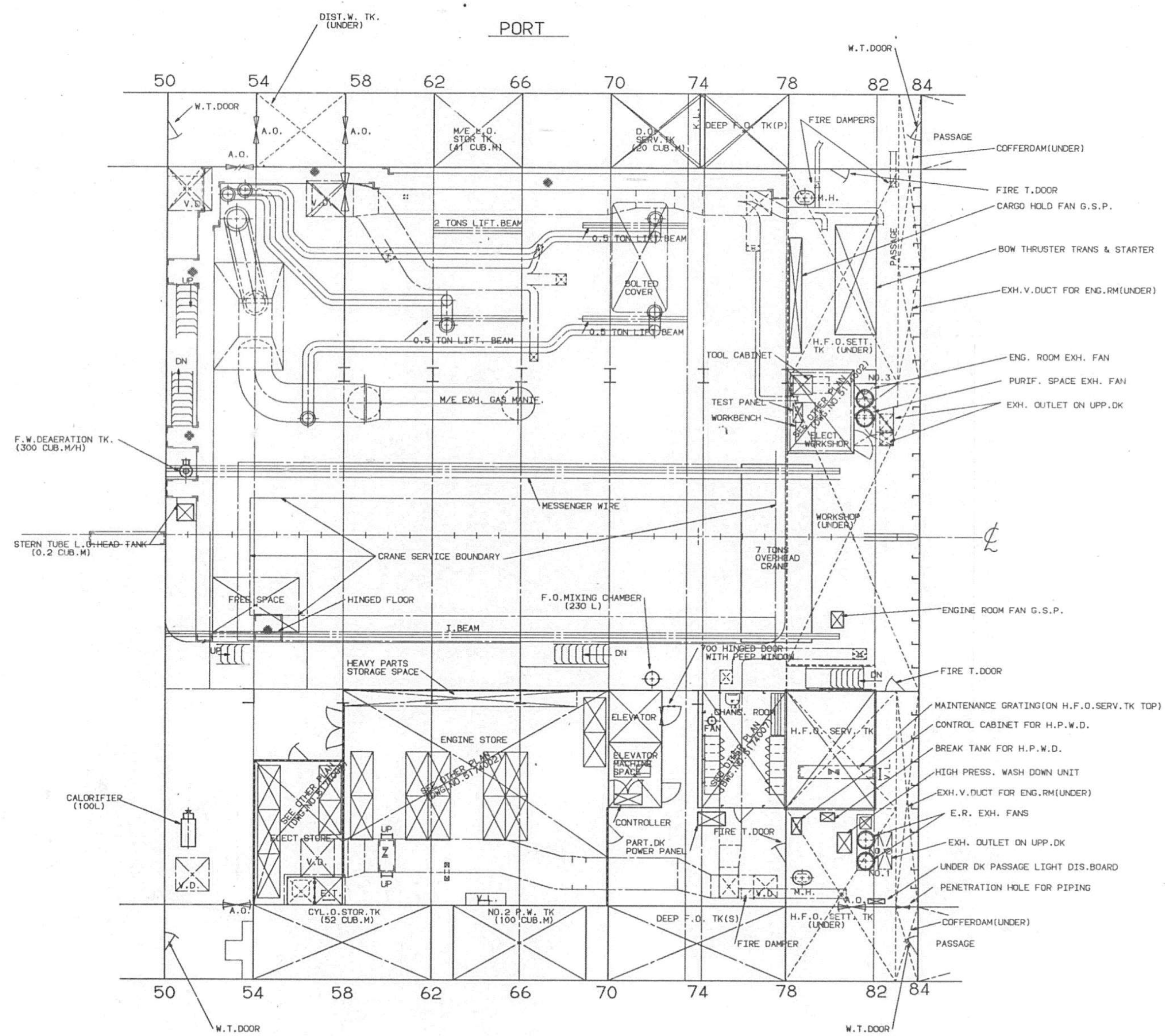
1372



2ND DECK PLAN

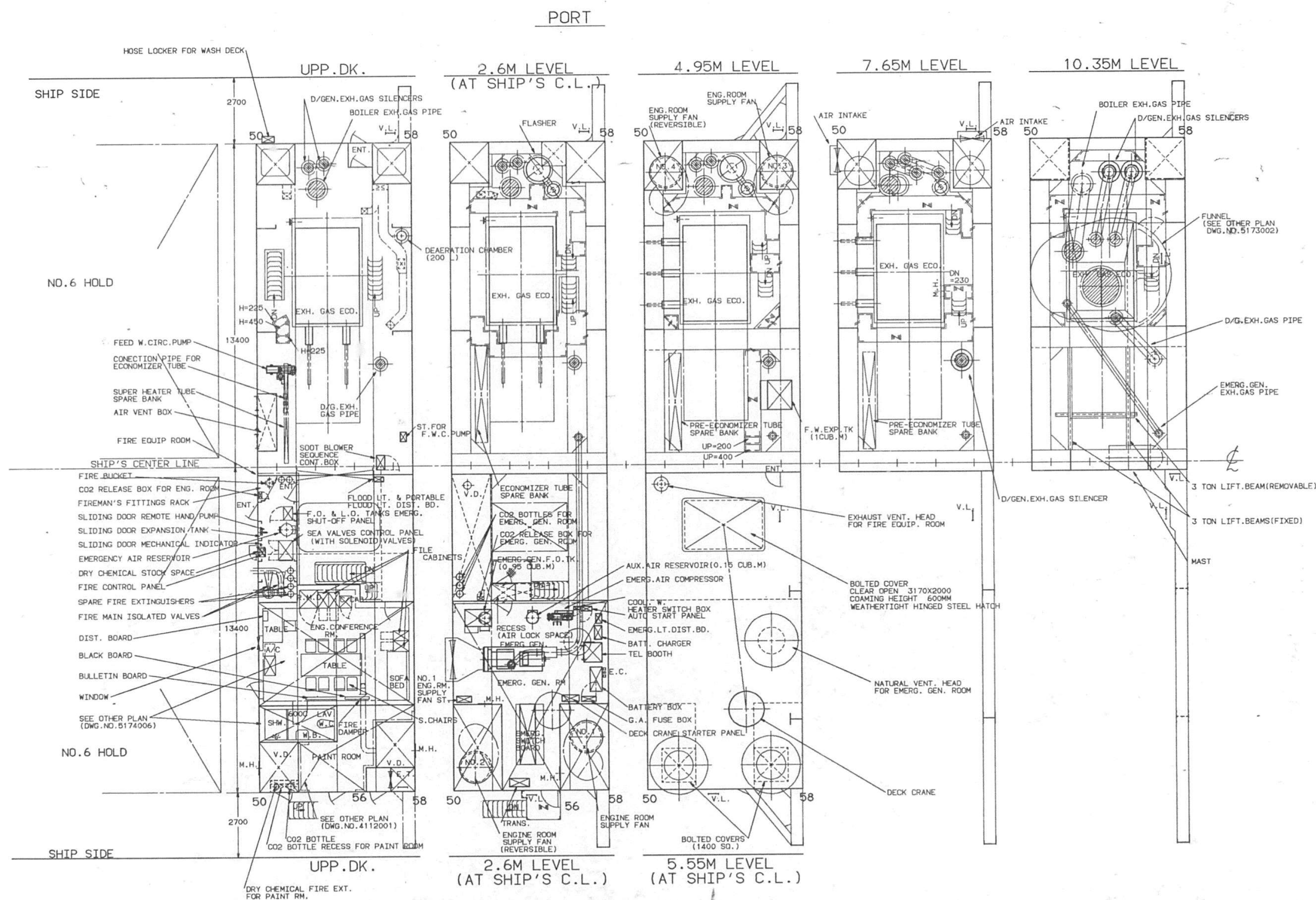
3/9

1373



PARTIAL DECK PLAN $\frac{4}{9}$

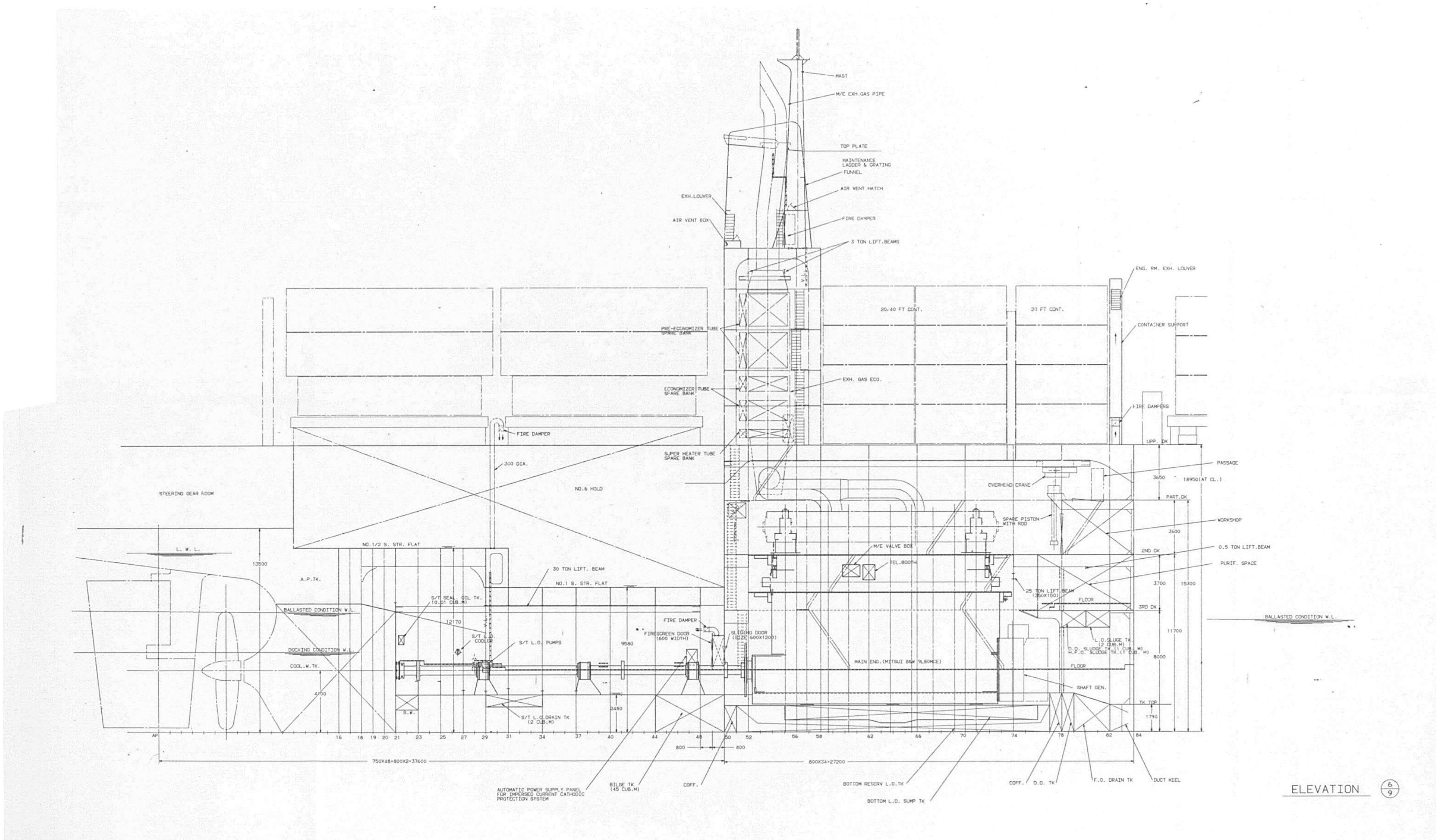
1374



UPP.DECK PLAN 5/9

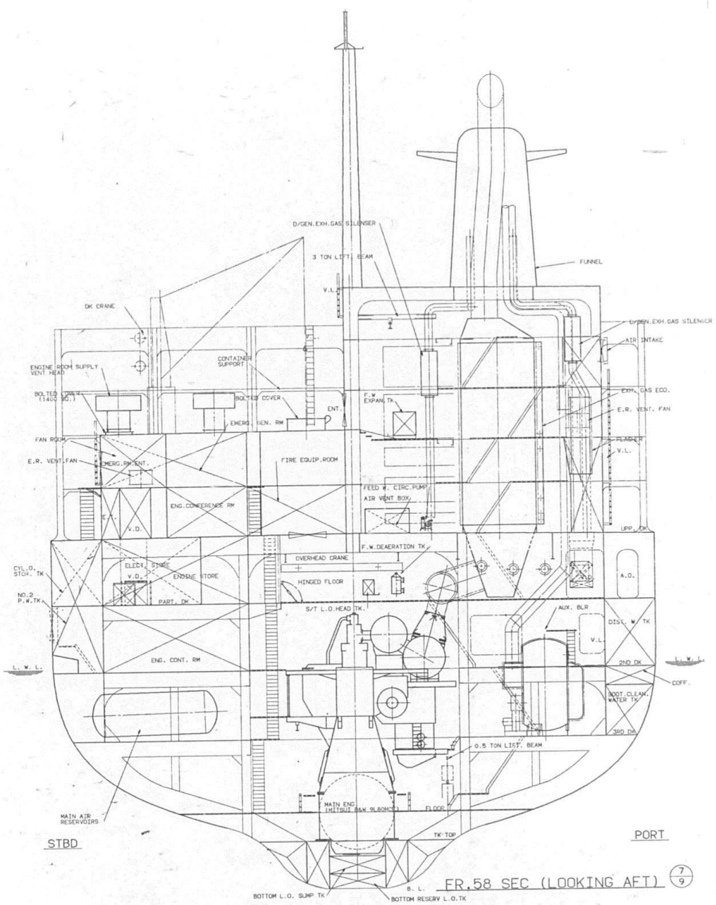
S. YOSHITANI

1375



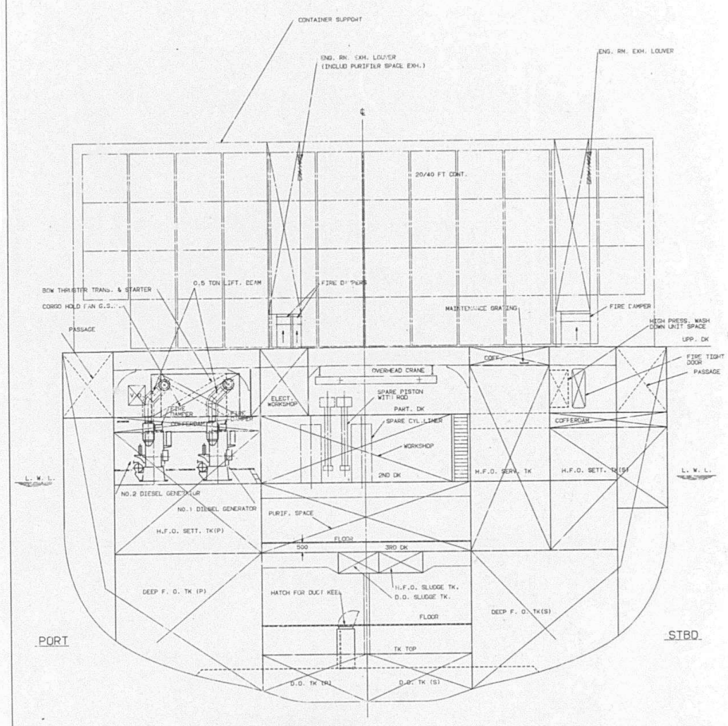
ELEVATION 6/9

1376

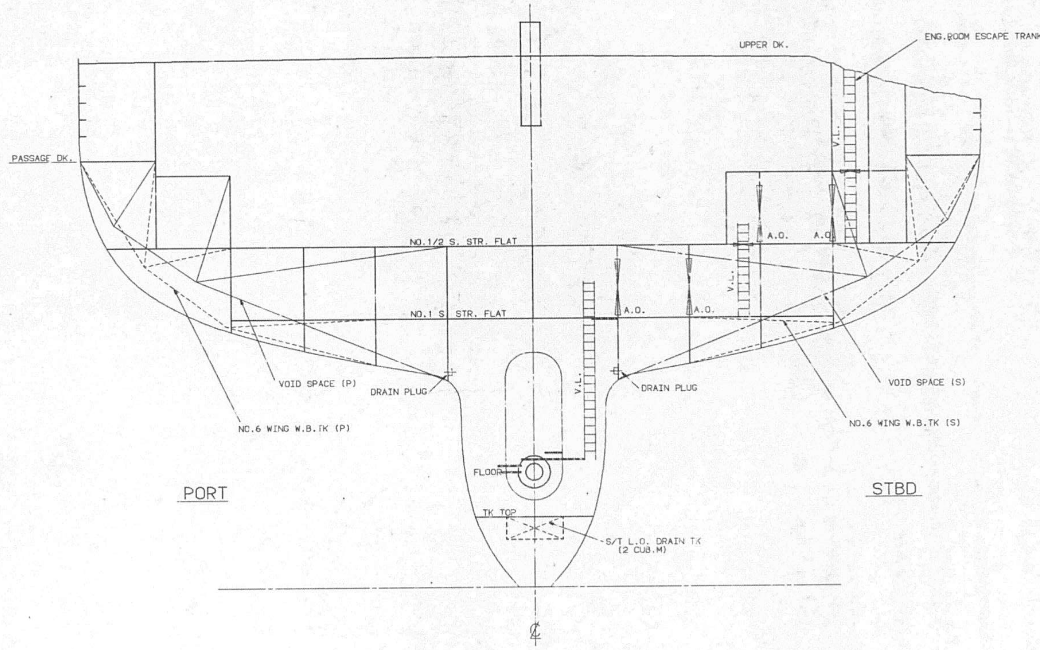


FR.58 SEC (LOOKING AFT) 7/9

1377



FR.78 SEC (LOOKING FORE) 8/9



FR.29 SEC (LOOKING FORE) 9/9

1/4

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	[illegible]	OFTS/MES-492	[illegible]	M-00417	APR.1985	7-8-2		
1ST	JULY 24, '85	OFTS/MES-781						

APPROVAL OF OWNER & REGULATORY BODIES

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
ELECT. OUTFIT., DESIGN SEC.
SEC. CHIEF
ASST. CHIEF
DATE (TEL 2225)

SHIP'S NO. 1325 SHIP'S NAME TILLIE LYKES

ARRANGEMENT OF ENGINE CONTROL ROOM
機関制御室
全体配置図

JOB NO. TS1323/24/25 | SCALE 1/100 | LYKES REF. NO. 400002 | MITSUI DRAWING NO. 5141011

(4 SHEETS WITH COVER)

2/4

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
△		PREPARED FOR SNO 1323 AS FINISHED PLAN, CHANGED AS FOLLOWS. CEILING LIGHT POSITION WAS CHANGED. MADE APPLICABLE TO SNO 1324 AND SNO 1325	

TS1323/4/5 DWG NO 5141011

3/4

GENERAL NOTE

1	THIS PLAN WAS DESIGNED AS THE RESULT OF DISCUSSION WITH OWNER IN JANUARY MEETING AT TAMANO.
2	THIS PLAN WAS REVISED IN ACCORDANCE WITH OWNER'S AND REGULATORY BODIES COMMENTS.
3	A-60 CLASS INSULATION AND HATCH COVER TO BE PROVIDED IN ACCORDANCE WITH USCG REQUIREMENTS.
4	THIS PLAN WAS REVISED IN ACCORDANCE WITH OWNER'S REQUEST AND OUR FURTHER STUDY

TS1323/4/5 DWG.NO. 5141011

4/4

REFERENCE

NO.	LYKES REF. NO.	DWG. NO.	DWG. NAME
1	400001	5151001	ARRANGEMENT OF ENG. ROOM & EMERG. GEN. ROOM INCLUDING FLOORING & VENT. AIR DUCTING
2		SK-F-010	ARRANGEMENT OF ENG. CONTROL ROOM
3	930009	4109101	CONSTRUCTION OF FIRE PROTECTION

TS1323/4/5
DWG 5141011

1380

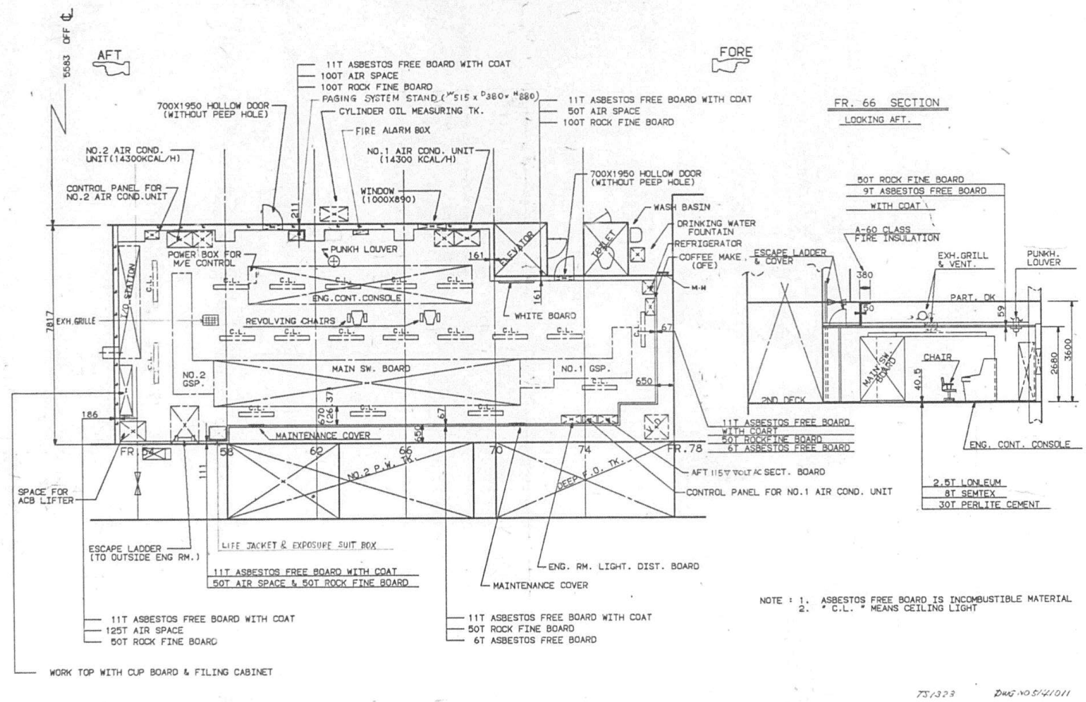
PRINCIPAL PARTICULARS OF MACHINERIES IN ENGINE CONTROL ROOM

EQUIPMENT	TYPE	PARTICULAR	NO	REMARKS
AIR CONDITIONING UNIT	EL. PACKAGE F.W. COOLED	14300 KCAL/H MOTOR 3.7KW x 3600 RPM	*2	

TS1323/L/5 DWG NO 5141011

ARRANGEMENT OF ENGINE CONTROL ROOM PLAN

(FRAME SPACE 800) SCALE 1/100



TS1323 DWG NO 5141011

PLAN RECORD

DWG NO.	MARK	DISCRIPTION	DATE	BY
ORIG.	—	MES 到来図を所内出図す [illegible]	MAR 28 '85	[illegible]
-10	△	MES 変更到来図を出図する.	JULY 26 '85	[illegible]
-20	△2	Altered by MHI for MHI Ship NO. 1158, 1159, 1164, and submitted to the Owner/ABS/USCG for approval.	SEP. 4 '85	[illegible]
		The part marked with △2 shows the alteration from MES drawing.		
		• M&B FELT & MG BOARD 150 (NICHIAS CORP.) are used as insulation material instead of "ROCK-FINE BOARD" (ASAHI ASBESTOS CO., LTD).		
		• Added USCG certificates for the materials proposed by MHI.		
		Approved by Owner without comment — Letter no. OFTS/MHI-058	Oct. 3 '85	
		Reviewed by ABS — Letter no. T-8-2	Nov. 21 '85	
		Approved by USCG with comment — Letter no. H-01250	Dec. 31 '85	
-30	△3-1, △3-3	MES 変更到来図を出図する (P.3.6)	APR 28 '86	[illegible]
-40	△4-1, △4	MES 変更到来図を出図する. (P.2.3.6.11)	JUNE 17 '86	[illegible]
-50	△5-3, △5	MES 変更到来図を出図する (P.6.11)	Nov. 28 '86	[illegible]
-F	—	Prepared as finished plan for S.No.1158	Mar. 17 '87	

NO. 1158	JAMES LYKES
~~NO. 1159~~	~~JOSEPH LYKES~~
~~NO. 1164~~	~~SOLON TURMAN~~

SHEETS WITH COVER

CON-FERRED	SHIP DESIGNING DEPARTMENT / ENGINE OUTFIT DESIGNING SECTION	CLASS	ABS, USCG
吉田 60.3.25	APPROVED [signature]		ARRANGEMENT OF ENGINE CONTROL ROOM
金山 60.3.25	CHECKED [signature]		
沢田 60.3.25	DRAWN T. Takasu		
	SCALE		
	ORDER 02-15800 ~~02-15000~~ ~~02-16400~~	ITEM / DRAWING NO. GA - 00301 - F	LYKES REF. NO. 400002

MITSUBISHI HEAVY INDUSTRIES, LTD.
KOBE SHIPYARD & ENGINE WORKS

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	T-8-2		

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SHIPYARD AND SHIP'S NO. & NAME			
~~MITSUI TAMANO~~		MITSUBISHI KOBE	
~~NO. 1323~~	~~DOCTOR LYKES~~	NO. 1158	JAMES LYKES
~~NO. 1324~~	~~ALMERIA LYKES~~	~~NO. 1159~~	~~JOSEPH LYKES~~
~~NO. 1325~~	~~TILLIE LYKES~~	~~NO. 1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER	SHIP'S NO.	SHIP'S NAME
ELECT. OUTFIT., DESIGN SEC. SEC. CHIEF [signature]	ARRANGEMENT OF ENGINE CONTROL ROOM	
ASSIST. CHIEF [signature]	機関制御室 全体配置図	
CHARGE ENG'R [signature]		
STAFF [signature]		
DATE (TEL 2225)		
JOB NO. TS1323/24/25	SCALE 1/100	LYKES REF. NO. 400002
JOBCLASSIF. NO.	MITSUI DRAWING NO.	5141011A-3

(6 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
ORIG.		WAS PREPARED FOR APPROVAL OF OWNER/ABS/USCG.	FEB. 21, '85
1ST	△-1	REVISED IN ACCORDANCE WITH OWNER'S COMMENTS	JULY 15, '85
	△-2	REVISED IN ACCORDANCE WITH REGULATORY BODIES' COMMENTS (ABS & USCG)	
	△-3	CORRECTED OUR PLAN IN ACCORDANCE WITH OUR FURTHER STUDY	
2ND	△-1	REVISED IN ACCORDANCE WITH OWNER'S REQUEST	JAN. 8, '86
	△-3	CORRECTED IN ACCORDANCE WITH OUR FURTHER STUDY	
3RD	△-1	REVISED IN ACCORDANCE WITH OWNER'S REQUEST.	JUNE 11, '86 S.J
4TH	△-3	REVISED IN ACCORDANCE WITH OUR FURTHER STUDY	JULY. 9, '86 S.C
		現場工事の都合で PAGING SYS, STAND の LOCATION を [illegible]	

TS1323/4/5 DWG. NO. 5141011 1

GENERAL NOTE

1	THIS PLAN WAS DESIGNED AS THE RESULT OF DISCUSSION WITH OWNER IN JANUARY MEETING AT TAMANO.
2	THIS PLAN WAS REVISED IN ACCORDANCE WITH OWNER'S AND REGULATORY BODIES'S COMMENTS.
3	A-60 CLASS INSULATION AND HATCH COVER TO BE PROVIDED IN ACCORDANCE WITH USCG REQUIREMENTS.
4	THIS PLAN WAS REVISED IN ACCORDANCE WITH OWNER'S REQUEST AND OUR FURTHER STUDY.
5	A STAND FOR PAGING SYSTEM WAS PROVIDED IN ACCORDANCE WITH OWNER'S REQUEST. ページングシステム用置台を船主要求で追加します. 本装置は TS1323 に [illegible]

TS1323/4/5 DWG. NO. 5141011 2

1382

NO.	LYKES REF. NO.	DWG. NO.	DWG. NAME
1	400001	5151001	ARRANGEMENT OF ENG. ROOM & EMERG. GEN. ROOM INCLUDING FLOORING & VENT, AIR DUCTING
2		SK-F-010	ARRANGEMENT OF ENG. CONTROL ROOM
3	930009	4109101	CONSTRUCTION OF FIRE PROTECTION

TS1323/4/5 DWG 5141011

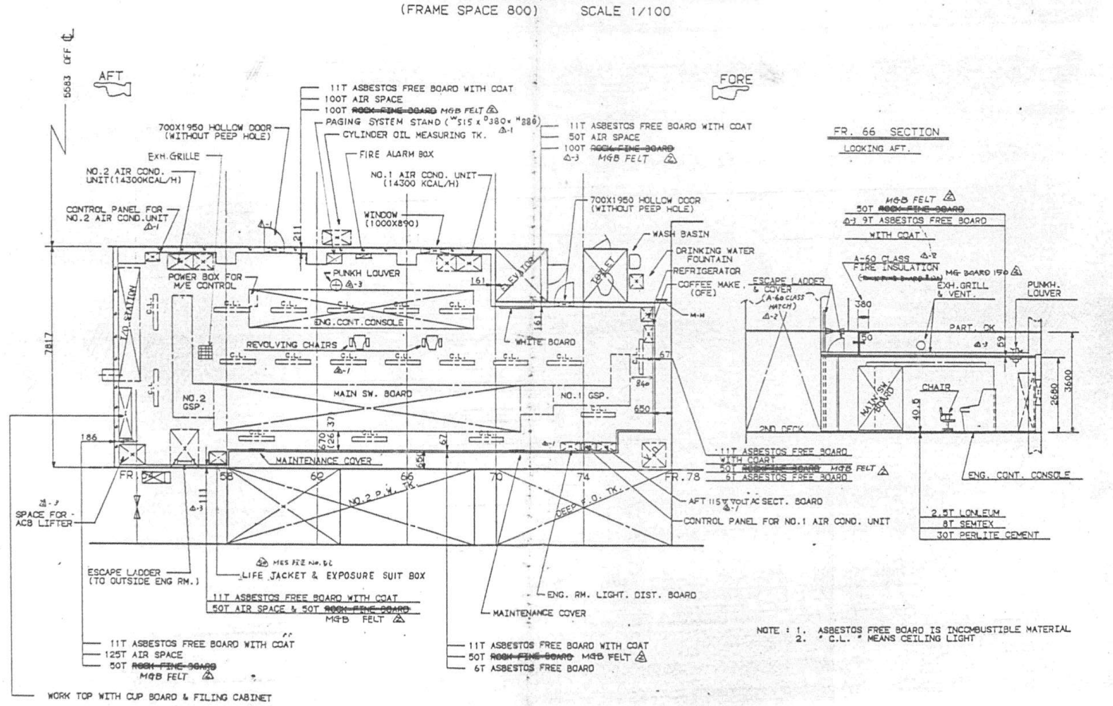
PRINCIPAL PARTICULARS OF MACHINERIES IN ENGINE CONTROL ROOM

EQUIPMENT	TYPE	PARTICULAR	NO	REMARKS
AIR CONDITIONING UNIT	EL. PACKAGE F.W. COOLED	14300 KCAL/H MOTOR 3.7KW x 3600 RPM	2	

TS1323/4/5 DWG NO. 5141011

ARRANGEMENT OF ENGINE CONTROL ROOM PLAN

(FRAME SPACE 800) SCALE 1/100



NOTE : 1. ASBESTOS FREE BOARD IS INCOMBUSTIBLE MATERIAL
2. " C.L. " MEANS CEILING LIGHT

TS1324/5 DWG NO 5141011 - 6

1383

ADDED 7/

ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL	EXPIRATION DATE	APPROVAL NUMBER
Nichias Corporation No. 1-26, 1-Chome Shibadaimon, Minato-ku Tokyo 105, Japan	for Structural Insulation	31 January 1988	164.007/57/0

DESCRIPTION

"MG Board 150" mineral wool type structural insulation identical to that described in Underwriters Laboratories, Inc. Report 82NK1027, File R 9833-1, dated October 11, 1982, approved for use without other insulating material to meet class A-60 requirements in 50, 100 and 150 mm thickness and nominal density of 8.6 pounds per cubic foot (137.5kg/cu. meter).

REMARKS Factory: Nagano, Japan

IDENTIFYING DATA Underwriters Laboratories Report 81NK15520, File R 9833, dated October 20, 1980, and 82NK1027, File R 9833-1, dated October 11, 1982.

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

Given Under My Hand This 31st Day of January 19 83 at Washington, D.C.

BY DIRECTION OF THE COMMANDANT
R.L. MARKLE, Acting CHIEF SURVIVAL SYSTEMS BR.
Office of Merchant Marine Safety, U.S.C.G.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 3-82) PREVIOUS EDITION IS OBSOLETE

TERMS: The approval of the item described on the face of the Certificate has been based upon the submittal of satisfactory evidence that the item complies with the applicable provisions of the navigation and vessel inspection laws and the applicable regulations in Title 33 and/or Title 46 of the Code of Federal Regulations. The approval is subject to any conditions noted on this Certificate and in the applicable laws and regulations governing the use of the item on merchant vessels subject to Coast Guard inspection or on other vessels and boats.

Consideration will be given to an extension of this approval provided application is made 3 months prior to the expiration date of this Certificate.

When materials or devices covered by the approval set forth on the face hereof are to be in production, the approval holder is responsible for making sure that the required inspections or tests are carried out as prescribed in the applicable regulations.

The approval of the item covered by this certificate is valid only so long as said item is manufactured in conformance with the details of the approved drawings, specifications, or other data referred to. No modification in the approved design, construction, or materials is to be adopted until same has been presented for consideration by the Commandant and confirmation received that the proposed alteration is acceptable.

NOTICE: Where a manufacturer of safety-at-sea equipment is offering for sale to the maritime industry, directly or indirectly, equipment represented to be approved, which fails to conform with either the design details or material specifications, or both, as approved by the Coast Guard, immediate action may be taken to invoke the various penalties and sanctions provided by law including prosecution under 46 U.S.C. 481, which provides in part:

"Any person who willfully and knowingly manufactures or sells, or offers for sale, or has in his possession with intent to sell, any lifesaving, firefighting, or other equipment subject to the provisions of title 52 of the Revised Statutes, as amended, which is so defective as to be inefficient to accomplish the purpose for which it is intended, shall be fined not more than $10,000 and may, in addition thereto, in the discretion of the Court, be imprisoned for a term not exceeding five years."

USCG-1

ADDED 8/

ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL	EXPIRATION DATE	APPROVAL NUMBER
Nichias Corporation No. 1-26, 1-Chome, Shibadaimon Minato-Ku, Tokyo 105, Japan	for Noncombustible Materials	June 15, 1986 Supersedes Cert. dated June 15, 1981. Formerly Nippon Asbestos Co., Ltd.	164.009/227/0

DESCRIPTION

"MGB Felt" fiberglass insulation type noncombustible materials identical to that described in Underwriters Laboratories, Inc. Report 80NK23663 File R8781, dated March 12, 1981, approved in nominal density of 4.6 pounds per cubic foot (70 kg/cu. meter).

REMARKS

Plant loction: Nara, Japan (Koriyama factory)

IDENTIFYING DATA Underwriters Laboratories, Inc. Report 80NK23663, File R8781, dated March 12, 1981, and manufacturer's letter dated July 14, 1980.

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect for a period of five years from the date hereon unless sooner canceled or suspended by proper authority.

Given Under My Hand This 15th Day of October 1981 at Washington, D. C.

BY DIRECTION OF THE COMMANDANT
N.W. LEMLEY, CHIEF, SURVIVAL SYSTEMS BRANCH, FOR
Chief, Merchant Marine Technical Division, U.S.C.G.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 9-67)

TERMS: The approval of the item described on the face of the Certificate has been based upon the submittal of satisfactory evidence that the item specified herein complies with the applicable provisions of the navigation and vessel inspection laws and the applicable regulations in Chapter I of Title 46 of the Code of Federal Regulations. The approval is subject to any conditions noted herein or in the applicable regulations governing the use thereof, for use on merchant vessels subject to Coast Guard inspection or on certain other vessels and motorboats as may be required by law or regulations.

Consideration will be given to an extension of this approval provided application is made 3 months prior to the expiration date of this Certificate.

When materials or devices covered by the approval set forth on the face hereof are to be in production, the Commander of the Coast Guard District in which the factory is located shall be notified in sufficient time to assign an inspector to the plant for the purpose of making any necessary inspections or tests.

The approval of the item covered by this certificate is valid only so long as said item is manufactured in conformance with the details of the approved drawings, specifications, or other data referred to. No modification in the approved design, construction, or materials is to be adopted until same has been presented for consideration through the Coast Guard District Commander and confirmation received that the proposed alteration is acceptable.

NOTICE: Where a manufacturer of safety-at-sea equipment is offering for sale to the maritime industry, directly or indirectly, equipment represented to be approved, which fails to conform with either the design details or material specifications, or both, as approved by the Coast Guard, immediate action may be taken to invoke the various penalties and sanctions provided by law including prosecution under 46 U.S.C. 481, which provides in part:

"Any person who willfully and knowingly manufactures or sells, or offers for sale, or has in his possession with intent to sell, any lifesaving, firefighting, or other equipment subject to the provisions of title 52 of the Revised Statutes, as amended, which is so defective as to be inefficient to accomplish the purpose for which it is intended, shall be fined not more than $10,000 and may, in addition thereto, in the discretion of the Court, be imprisoned for a term not exceeding five years."

USCG-207

ADDED 9/

ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL	EXPIRATION DATE	APPROVAL NUMBER
Nichias Corporation No. 1-26, 1-Chome, Shibadaimon, Minato-Ku, Tokyo 105, Japan	for Noncombustible Material	5 May 1988 Extension of Appr. 164.009/209/0 dated 28 January 1982.	164.009/209/0

DESCRIPTION

"Marine Board K-900" mineral composition board identical to that described in Underwriters Laboratories, Inc. Reports 78NK1501, File R2681, dated 24 March 1978 and 5 April, 1978 approved in nominal 61 pounds per cubic foot density.

REMARKS Factory addresses: 2046, 3-Chome, Ohji-Machi Kita Katsuragi-Gun, Nara 636, Japan 3365 Kitsunezuka, Takehana - Cho, Hasima - City, Gifu 501-62, Japan.

IDENTIFYING DATA Underwriters Laboratories, Inc. Reports 78NK1501, File R2681, dated 24 March and 5 April, 1978, and manufacturer's letter dated 6 January 1978.

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

Given Under My Hand This 5th Day of May 19 83 at Washington, D.C.

BY DIRECTION OF THE COMMANDANT
R.L. MARKLE, CHIEF SURVIVAL SYSTEMS BR.
Office of Merchant Marine Safety, U.S.C.G.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 3-82) PREVIOUS EDITION IS OBSOLETE

TERMS: The approval of the item described on the face of the Certificate has been based upon the submittal of satisfactory evidence that the item complies with the applicable provisions of the navigation and vessel inspection laws and the applicable regulations in Title 33 and/or Title 46 of the Code of Federal Regulations. The approval is subject to any conditions noted on this Certificate and in the applicable laws and regulations governing the use of the item on merchant vessels subject to Coast Guard inspection or on other vessels and boats.

Consideration will be given to an extension of this approval provided application is made 3 months prior to the expiration date of this Certificate.

When materials or devices covered by the approval set forth on the face hereof are to be in production, the approval holder is responsible for making sure that the required inspections or tests are carried out as prescribed in the applicable regulations.

The approval of the item covered by this certificate is valid only so long as said item is manufactured in conformance with the details of the approved drawings, specifications, or other data referred to. No modification in the approved design, construction, or materials is to be adopted until same has been presented for consideration by the Commandant and confirmation received that the proposed alteration is acceptable.

NOTICE: Where a manufacturer of safety-at-sea equipment is offering for sale to the maritime industry, directly or indirectly, equipment represented to be approved, which fails to conform with either the design details or material specifications, or both, as approved by the Coast Guard, immediate action may be taken to invoke the various penalties and sanctions provided by law including prosecution under 46 U.S.C. 481, which provides in part:

"Any person who willfully and knowingly manufactures or sells, or offers for sale, or has in his possession with intent to sell, any lifesaving, firefighting, or other equipment subject to the provisions of title 52 of the Revised Statutes, as amended, which is so defective as to be inefficient to accomplish the purpose for which it is intended, shall be fined not more than $10,000 and may, in addition thereto, in the discretion of the Court, be imprisoned for a term not exceeding five years."

USCG-202

ADDED 10/

ISSUED TO	UNITED STATES COAST GUARD CERTIFICATE OF APPROVAL	EXPIRATION DATE	APPROVAL NUMBER
Nitto Boseki Co., Ltd. 8-1, Yaesu 2 Chome Tokyo, Japan	for Interior Finish	8 November 1989 Extension of Appr. 164.012/40/0 dated 8 November 1979.	164.012/40/0

DESCRIPTION

"Melanitto NVA" and "NP" decorative melamine laminates, identical to those described in Underwriters Laboratories Report 78SE8167, File R7703, dated 11 June 1979, in nominal thickness of 1.4 mm (0.055 inch). Bonded with Koppers Penacolite G-1124 adhesive in accordance with manufacturers instructions.

REMARKS Plant: Nitto Boseki Co., Ltd., Suzuka Works, 2628 Minamo, Tanagaki-Cho, Suzuka City, Mie Pref. Japan.

IDENTIFYING DATA Underwriters Laboratories Report 78SC8167, File R7703, dated 11 June 1979.

THIS IS TO CERTIFY THAT the above named manufacturer has submitted to the undersigned satisfactory evidence that the item specified herein complies with the applicable laws and regulations as outlined on the reverse side of this Certificate, and approval is hereby given. This approval shall be in effect until the expiration date hereon unless sooner canceled or suspended by proper authority.

Given Under My Hand This 8th Day of November 19 84 at Washington, D.C.

BY DIRECTION OF THE COMMANDANT
R. L. MARKLE, CHIEF, SURVIVAL SYSTEMS BR.
Office of Merchant Marine Safety, U.S.C.G.

DEPT. OF TRANSP., USCG, CGHQ 10030 (Rev. 3-82) PREVIOUS EDITION IS OBSOLETE

TERMS: The approval of the item described on the face of the Certificate has been based upon the submittal of satisfactory evidence that the item complies with the applicable provisions of the navigation and vessel inspection laws and the applicable regulations in Title 33 and/or Title 46 of the Code of Federal Regulations. The approval is subject to any conditions noted on this Certificate and in the applicable laws and regulations governing the use of the item on merchant vessels subject to Coast Guard inspection or on other vessels and boats.

Consideration will be given to an extension of this approval provided application is made 3 months prior to the expiration date of this Certificate.

When materials or devices covered by the approval set forth on the face hereof are to be in production, the approval holder is responsible for making sure that the required inspections or tests are carried out as prescribed in the applicable regulations.

The approval of the item covered by this certificate is valid only so long as said item is manufactured in conformance with the details of the approved drawings, specifications, or other data referred to. No modification in the approved design, construction, or materials is to be adopted until same has been presented for consideration by the Commandant and confirmation received that the proposed alteration is acceptable.

NOTICE: Where a manufacturer of safety-at-sea equipment is offering for sale to the maritime industry, directly or indirectly, equipment represented to be approved, which fails to conform with either the design details or material specifications, or both, as approved by the Coast Guard, immediate action may be taken to invoke the various penalties and sanctions provided by law including prosecution under 46 U.S.C. 481, which provides in part:

"Any person who willfully and knowingly manufactures or sells, or offers for sale, or has in his possession with intent to sell, any lifesaving, firefighting, or other equipment subject to the provisions of title 52 of the Revised Statutes, as amended, which is so defective as to be inefficient to accomplish the purpose for which it is intended, shall be fined not more than $10,000 and may, in addition thereto, in the discretion of the Court, be imprisoned for a term not exceeding five years."

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	SEP. 26.'85	OFTS/MES-958						
A	JUN.26.'86	OFTS/MES-1146						

APPROVAL OF OWNER & REGULATORY BODIES

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO.
SHIP'S NAME **TILLIE LYKES**

OUTFITTING DESIGN SECTION
SEC.CHIEF
ASSIST.CHIEF
CHARGE ENG'R
STAFF
DATE (TEL 2235)

機関部要目表
PRINCIPAL PARTICULARS OF MACHINERY PART

JOB NO. TS1323/24/25	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
JOBCLASSIF.NO.		400003	5110003

(SHEETS WITH COVER)

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		~~WAS~~ PREPARED FOR S.NO.1323 AS FINISHED PLAN, APPLICABLE TO S.NO.1324 AND S.NO.1325	JUL. 9.'86

DWG.NO. 5110003

MACHINERY PARTICULARS
(MOTOR SHIP)
FOR LYKES LINES

TS1323/4/5

S.NO. 1325	SHIP NAME TILLIE LYKES	KIND OF SHIP CONTAINER
D.W 44,966 MT	HULL DIMENSION: Lpp x B x D x d 245.0 x 32.2 x 18.8 x 10.25/11.88Cb	
SPEED: 21.0 kts at d = 10.25	CLASS & REGUL: ABS (ACCU), USCG	F.O. CONSUMP. 75.0 T/DAY (LCV=10,200)
KEEL LAID: APR. 1, 1986	LAUNCH: JULY 10, 1986	DELIVERY: NOV. 4, 1986

MAIN ENGINE

TYPE	9L80MCE		NO. OF SET		1
OUTPUT	B. H. P.	I. H. P.	R. P. M.	P: kg/cm²	F.O. RATE
M. C. O.	28,800		83.0		124.0
C. S. O.	25,500		79.7		122.6
					based on L.C.V. 10200

SIZE	NO. OF CYL: 9 BORE: 800 STROKE: 2,592 WEIGHT: 1,020 KT
TURBOCHARGER	NO. OF SET: 2 TYPE: MITSUI-M.A.N. NA70 MAKER: MITSUI
	REMARKS: EXH. GAS BYPASS WITH A VALVE (TEMPORARY USE) 10°C TMEP. UP
INTERCOOLER	NO. OF SET: 2 DESIGN: F.W.Cooled(37°C) MAKER: KAWASAKI
MATERIAL	TUBE: Cu-Ni (STD) TUBE PLATE: STD CASING: FC (Tar epoxy coated)
AUX. BLOWER	NO. OF SET: 2 TYPE: ABBW6041 MAKER: OSAKA BLOWER
	CAPACITY: 3.1/6.6 m³/sec. x 610/295 mmAq. MOTOR: 60 KW 3,600 RPM
MENEUVERING POSITION	BRIDGE, BRIDGE WINGS, CONTROL ROOM, ENGINE SIDE
CYLINDER LINER	STUFFING BOX: MITSUI B&W TYPE
GOVERNOR	TYPE: PNEUMATIC-HYDRAULIC MAKER: WOODWARD
LUBRICATOR	NO. OF HOLES PER CYL: 8 MAKER: MITSUI
CJC FILTER	NO. OF SET: 2 SETS MAKER: AMEROID JAPAN
OIL MIST DETECTOR	NO. OF POINT: 10 MAKER: GRAVINER
FIRE DETECTOR IN SCAV.	NO. OF POINT: 9 MAKER: DANFOSS
FIRE EXTINGUISH. IN SCAV	STEAM
TURNING GEAR	MOTOR: 11 KW 1,200 RPM WITH REMOTE CONTROL: MAKER: NISHISHIBA
BALANCER	NOT FITTED
SPARE PARTS	CYLINDER COVER: 1 CYLINDER LINER: 1 PISTON: 1
	PISTON ROD: 1 F.O. INJECTION PUMP CYLINDER: 1 FUEL VALVE: 20
	EXH. VALVE: 3 TURBOCHARGER ROTOR: -
SPEICAL TOOLS	
REMARKS	INSTALLATION: INVERSE (BACK AND FORTH) TYPE

AUXIARY BOILER

TYPE	MARINE VERTICAL BOILER MC90A — NO. OF SET 1
EVAPORATION	MAX. 8,500 kg/h — MAKER M H I
STEAM CONDITION	11 kg/cm² (psi) Sat. °C (°F)
FEED TEMP.	60°C (°F) — DESIGN PRESSURE 12.5 kg/cm²
F.O. SYSTEM	H.F.O. AND WASTE OIL SHALL BE BURNT (AUTOMATIC CHANGE-OVER TYPE)
AUXILIARY	1 SET OF WASTE OIL SERVICE PUMP, 1 SET OF SLUDGE GRIND. P. SEE ALSO PAGE 3, 4
HEATING SURFACE	99.59 m²
SIZE	2,300 ømm x 4,875 m/m WEIGHT: 15 KT
F.O. CONSUMPTION	661 kg/Hr, BOILER EFF: 82.5% L.C.V.: 9,800 kca/kg
A. C. C.	TYPE: ON/OFF & PROPORTIONAL CONTROL MAKER: VOLCANO
BURNER	TYPE: STEAM JET SFUO 330 NO.: 1 MAKER: VOLCANO
FEED REGULATOR	TYPE: DIFF. PRESS. CONTROL MAKER: YAMATAKE
REMOTE LEVEL GAUGE	TYPE: EV-96 EDGEWISE GAUGE MAKER: YAMATAKE
SOOT BLOWER	ROTARY TYPE AND STATIONARY TYPE

FLASHER

TYPE	VERTICAL WITH DRAIN TANK
EVAPORATION	2,760 kg/h — DESIGN PRESSURE 5 atg
STEAM CONDITION	0.8 atg Sat.

EXHAUST GAS ECONOMIZER

TYPE	BENT BARE AND FINNED TUBE, WITH PRE AND SUPER HTR — NO. OF SET: 1
EVAPORATION	4,415 kg/Hr AT MAIN ENGINE OUTPUT OF NSR
STEAM CONDITION	6.5 kg/cm², SAT. (°C)
FEED TEMP.	34.1 °C — DESIGN PRESSURE: 18 kg/cm²G — MAKER: MITSUI
EXH. GAS TEMP.	INLET: 238.1 °C, OUTLET: 134.3 °C, FLOW: 167292 kg/Hr.
HEATING SURFACE	S/H ECO. P.H. 64 m², 2438 m², 1288 m² SIZE: 2,900m/m x 4,210m/m x 9,750m/m, WEIGHT: 83.3 KT
STEAM SEPARATOR	NONE (AUX. BOILER DRUM SHALL BE USED.)
EXH. GAS BY-PASS	TYPE: NONE
REMOTE LEVEL GAUGE	NONE
SOOT BLOWER	TYPE: REMOTE SEQUENTIAL NO. OF SET: 10
REMARKS	EXHAUST GAS HEAT RECOVERY SYSTEM (ATG-F' SYSTEM) SHALL BE APPLIED WITH THE TURBOGENERATOR AND FLASHER.

SHAFT GENERATOR

TYPE	MAIN ENGINE FORWARD END MOUNTED, DIRECT DRIVEN — NO. OF SET: 1
OUTPUT	RATED 2,000 KW at 62-83 RPM, REDUCED IN SPEED-PROPORTION (50-62 RPM)
GENERATOR	2,500 KVA (P.F. = 0.8), AC 480V, 60 CYCLE, 3 PHASES
	MAKER: SIEMENS
GEN. TYPE	SEPARATE EXITATION THROUGH BRUSH, HALF ENCLOSED, FORCED VENT., SYNCHRONOUS GENERATOR
AUXILIARY	SYNCHRONOUS COMPENSATOR: DRIP-PROOF, MOTOR DRIVEN TYPE, 1,800 RPM
	STATIC CONVERTER-INVERTER PANEL: DRIP-PROOF, SELF STANDING TYPE
REMARKS	

DIESEL GENERATOR

ENGINE	TYPE: 4 CYCLE, TRUNK PISTON, TURBOCHARGED 6DL-24 — NO. OF SET: 3
B. H. P.	1,170 PS R.P.M.: 720 — MAKER: DAIHATSU
SIZE	NO. OF CYLINDER: 6 BORE: 240 STORKE: 320 WEIGHT: 18.7 KT
KIND OF F.O.	380 cSt (at 50°C) HFO OR BLENDED OIL AND DIESEL OIL (START, STOP AND LOW LOAD)
GENERATOR	TYPE: BRUSHLESS DRIP-PROOF MAKER: SHINKO ELECT.
OUTPUT	800 KW, 1,000 KVA AC. 480 V, 60 CYCLE, 3 PHASE
TURBOCHARGER	TYPE: IHI BBC VTR-201 MAKER: IHI
CJC FILTER	FITTED AS BYPASS FILTER (EACH ONE SET) MAKER: AMEROID JAPAN
GOVERNOR	TYPE: HYDRAULIC MAKER: WOODWARD UG-8D
L.O. COOLER	MATEIRAL: TUBE AL-BRASS TUBE PLATE NAVAL BRASS
DIRECT DRIVEN PUMP	COOL. F.W. PUMP, F.O. SUPPLY PUMP, FUEL VALVE COOL. OIL PUMP, L.O. PUMP
	ROCKER ARM L.O. PUMP
SPARE PARTS	CYLINDER COVER: - CYLINDER LINER: - PISTON: -
	PISTON ROD: - FUEL VALVE: 3 CYL. INLET VALVE: 1 CYL.
	EXH. VALVE: 2 CYL. FUEL PUMP: 1 CYL. TURBOCHARGER ROTOR: -
REMARKS	F.O. AUTO CHANGE OVER WITH 35% LOAD (D.O. TO B.F.O. OR VISE VERSA)

TURBO GENERATOR

	TYPE: HORIZONTAL, MIXED PRESS., CONDENS. WITH EXTRACTION AT-34E NO. OF SET: 1
ELECTRIC OUTPUT	RATED 800 KW 1,800 RPM, WEIGHT: 9.5 KT
	AT C.S.O. OF M/E: 800 KW (IN SUMMER) 590 KW (IN WINTER)
STEAM IN COND.	RATED: 10.5 atg x Sat.
	AT C.S.O. OF M/E:
TURBINE EXH. PRESS	RATED: 695 mmHgV. AT C.S.O. OF M/E:
REDUCTION GEAR	TYPE: G-8-1800H SINGLE HELICAL SINGLE REDUCT. GEAR R.P.M.: 1,800
	MAKER: SUMITOMO METAL
GENERATOR	TYPE: TOTALLY ENCLOSED, F.W. COOLED MAKER: SHINKO ELECT.
OUTPUT	800 KW, 1,500 KVA. AC 480 V 60 CYCLE, 3 PHASE
R. P. M.	1,800
L.O. COOLER	TYPE: SHELL & TUBE COOL. SURFACE: 9 m²

EMERG. GENERAT.

GLAND CONDENSER	TYPE: SHELL & TUBE COOL. SURF.: 1.5 m^2 MAKER: YAMASHINA SEIKI
	FAN: 11.5 m^3/min. x 265 mmAq x 0.75 KW x 3600 RPM
TYPE	TWO CYCLE, RADIATOR COOLED 8V-71T NO. OF SET 1
B. H. P.	335 R.P.M. 1,800 MAKER G.M. Detroit Diesels
SIZE	NO. OF CYL: 8 BORE: 107.95 m/m STROKE: 127 m/m
GENERATOR OUTPUT	210 KW, 262.5 KVA, AC 480V 60 CYCLE 3 PHASES
STARTING DEVICE	AIR GEN. MAKER: SHINKO ELECT.
REMARKS	WITH ELECTRIC HEATER FOR JACKET COOL. WATER SYSTEM

SHAFTING & PROPELLER

	NO.	DIA m/m	LENGTH m/m	REMARKS
INTERMEDIATE SHAFT	2	650	NO. 1 8,335 NO. 2 11,500	Rule req. dia. 630.0 mm
PROPELLER SHAFT	1	775	13,700	Rule req. dia. 768.2 mm
INT. SHAFT BEARING	TYPE DISC LUBRICATING		NO. OF SETS 3	
STERN TUBE	TYPE: FORCED LUBRICATING MATERIAL OF BUSH: WHITE METAL (WJ-2) SEALING: COMPACT			
PROPELLER	TYPE: SOLID, KEYLESS NO. OF BLADE: 5 DIA: 8,100 P.R.: 0.980			
MATERIAL	Ni-Al-Br (NIKALIUM) WEIGHT: 41,750 kg Ip: WR^2 = 54605 kg.m^2			
REMARKS	PROPELLER CAP: F.R.P. MAKER: STONE MANGANESE MARINE			
SPARE	PROPELLER 1 (PER 6 VESSELS) PROPELLER SHAFT 1 (PER 6 VESSELS)			

AUXILIARY MACHINERIES (IN ENGINE ROOM)

ITEM	TYPE	NO.	CAPACITY	KW	RPM	REMARKS (MAKER etc.)
MAIN AIR COMPRESSOR	EL.VER. 2 STAGE F.W.COOL.RECIPRO.	3	300Nm³/h x d30atg	75	900	HC277A-YS (TANABE)
TOPPING AIR COMPRESSOR	"	1	132Nm³/h x d30atg	37	900	HC264A-YS (TANABE)
CONTROL AIR COMPRESSOR	EL.HOR.CENT.OIL FREE WATER DIS	1	160Nm³/h x d7atg	37	1800	NASH1251C (NASH)
SHIP SERV.AIR COMPRESSOR	EL. VER. AIR COOL. RECIPRO.	1	300Nm³/h x d9atg	37	1800	VLH114 (TANABE)
EMERG. AIR COMPRESSOR	VER.AIR COOL.RECI-PRO.ENG.DRIVEN	1	5 Nm³.h x d30atg	3.5 PS	2000	LSHC-20B(TANABE) NS-40(YAMMER)
NO. 1 MAIN COOL. S.W. PUMP	EL. VER. CENT.	1	490/375 m³/h x T15/6.5 m	30/11	1800/1200	SVS250 (2 SPEED)(SHINKO KINZOKU)
NO. 2/3 MAIN COOL. S.W. PUMP	"	2	490m³/h x T15m	30	1800	SVS250 (SHINKO KINZOKU)
HIGH TEMP. COOL. F.W. PUMP	"	2	175m³/h x T18m	15	1800	SVS150 (SHINKO KINZOKU)
LOW TEMP. COOL. F.W. PUMP	"	3	450m³/h x T22m	37	1800	SVS250 (SHINKO KINZOKU)
HEELING PUMP	EL. VER. PROPEL	1	1000m³/h x T25m	100	1800	RBP2-300 (FRAMO)
MAIN L.O. PUMP	EL. VER SCREW	2	550m³/hxd4.2atg	132	1200	MSVS540W-6MB (TAIKO)
GEN. TURB. PRIM. L.O. PUMP	EL. HOR. GEAR	1	3 m³/h x d6atg	2.2	1200	NHG3B (TAIKO)
CAMSHAFT L.O. PUMP	"	2	12m³/h x d4atg	5.5	1200	NHG12B (TAIKO)
L.O. TRANS. PUMP	"	1	5 m³/h x d3atg	2.2	1200	NHG5B (TAIKO)
FILTER L.O. PUMP	"	1	0.1 m³/h x d3atg	0.2	1200	NHG0.1 (TAIKO)
STERN TUBE L.O. PUMP	"	2	2 m³/h x d2.5atg	0.75	1200	NHG2B (TAIKO)
GEN. ENG. PRIM. L.O. PUMP	"	3	3 m³/h x d35atg	1.5	1200	NHG3B (TAIKO)
F.O. CIRC. PUMP	"	2	11 m³/h x d10atg	5.5	1200	HHB10M (TAIKO)
F.O. BOOST. PUMP	"	2	6 m³/h x d4atg	2.2	1200	NHG6B (TAIKO)
HEAVY F.O. TRANS. PUMP	EL. VER. GEAR	2	50 m³/h x d3atg	18.5	1200	VG50B (TAIKO)
D.O. TRANS. PUMP	EL. HOR. GEAR	2	5 m³/h x d3atg	1.5	1200	NHG5B (TAIKO)
AUX. COND. CIRC. PUMP	EL. VER. CENT.	2	800/600 m³/h x T8/4.5 m	30/15	1200/900	SVS350 (2 SPEED) (SHINKO KINZOKU)
FIRE & G.S. PUMP	"	2	175/265 m³/h x T112/25 m	110	1800	GVP200-2S(Selfpriming)(SHINKO KINZOKU)
BALLAST PUMP	"	1	500m³/h x T25 m	45	1800	SVS250S (Selfpriming)(SHINKO KINZOKU)
BILGE & BALLAST PUMP	"	1				
F.W. TRANSFER PUMP	"	1	15 m³/h x T20m	2.2	3600	HJ65 (SHINKO KINZOKU)
BILGE PUMP	EL. VER. RECIPRO.	1	5 m³/h x d3atg	1.5	1200	PVN-5(HEISHIN)
BILGE SEPA. SERVICE PUMP	"	1				
SLUDGE PUMP	EL. HOR. SNAKE	1	2 m³/h x d3atg	1.5	1200	HNP-301 (TAIKO)
FRESH WATER PUMP	EL. VER. CENT.	2	5 m³/h x T50m	3.7	3600	UH102L with 1 m³ HYD.TANK(SHINKO)
F.O. PURIF. FEED PUMP	EL. HOR GEAR	2	4.5/2.1 m³/h x d4atg	2.2/1.1	1200/600	NHG5B (2 SPEED) (TAIKO)
L.O. PURIF. BOOST. PUMP	"	1	5 m³/h x d1atg	1.5	1200	NHG5B (TAIKO)
PILOT BURNER PUMP	"	1	24 kg/h x d10 15atg	0.4	1800	GF-2(NIPPON GERTOR) (BOILER MAKER SUPPLY)
SEWAGE TRANS. PUMP	EL. HOR. SNAKE	1	1 m³/h x d3atg	0.75	1200	HNP-201 (TAIKO)
AIR CLR CHEM. CLEAN. PUMP	EL. HOR. CENT.	1	10 m³/h x T20m	2.2	3600	AHJ50-2 (SINKO KINZOKU)
FEED WATER CIRC. PUMP	EL. HOR. CENT.	1	30 m³/h x T 30m	5.5	3600	BT70-4M (SHINKO KINZOKU)

AUX. MACHINERIES (IN ENGINE ROOM)

ITEM	TYPE	NO.	CAPACITY	KW	RPM	REMARKS (MAKER etc.)
DRINK. W. STERILIZER	ULTRA VIOLET	1	1.8 m³/h			(BULL & ROBERTS) BR-500
WASTE OIL BURN. PUMP	EL. MOHNO	1	1.1 m³/h x 12 atg	1.5	1200	(HEISHIN ENG.) 2NE-30A (BOILER MAKER SUPPLY)
SLUDGE GRIND. PUMP	EL.	1	1.5 m³/h x 0.5 atg	3.7	1800	(VOLCANO) (")
A/C BLENDER	DINAMIC MIX.	1	800 L/h x 2	1.5	1200	S-A2H2 (DODWELL)
FEED PUMP	EL. HOR. CENT.	2	28m³/hxt171m	37	3600	SK50-4 (SHINKO KINZOKU)
CONDENSATE PUMP	EL. V. CENT.	2	15m³/h x 35m	7.5	1800	EVZ70 (SHINKO KINZOKU)
AUX. COND. VACUUM PUMP	EL. H. ELMO.	2	1m³/h at 720 mmHg	5.5	1800	UVE-102-1 (SHINKO KINZOKU)
BLR W. CIRC. PUMP	EL. HOR. CENT.	2	2.5m³/hxT45m/8atg	7.5	3600	BT70-4M (SHINKO KINZOKU)
FORCED DRAFT FAN	EL. TURBO	1	200Nm³/min x 220mmAq	15	3600	(AZUMA SOFUKI) (BOILER MAKER SUPPLY)
BOILER F.O. BURN. PUMP	EL. HOR. SCREW	2	1,100L/h x 16atg/	3.7	1200	MSH-2X-4MB (TAIKO)
F.O. FILTRATOR UNIT	AUTOCLEAN. WITH PUMP & TANK	1	4,500 L/h, 5 u			8, 12, 250, 5, 500 (MISUZU)
H.F.O. PURIFIER	EL.CENT. PARTIAL DIS.WITH W.SENSOR	2	4,410L/h	15	1800	POPX613 (NAGASE-ALFA)
DIESEL OIL PURIFIER	EL.CENT.SELFCREAN.	1	3,650L/h	7.5	1800	MOPX207 (NAGASE-ALFA)
L.O. PURIFIER	"	2	4,200L/h	11	1800	MOPX310 (NAGASE-ALFA)
AUX. L.O. PURIFIER	"	1	800 L/h	2.2	1800	MAPX204 (NAGASE-ALFA)
ENG. CONT. RM AIR COND. UNIT	EL. PACKAGED	1	8.6 x 10³ Kcal/h	2.2	3600	DP37K EL.HTR. 9KW (TOYO ENG.)
ENG. RM. VENT FAN	EL. VER. AXIAL	2	1000/750 Nm³/min x 35/20 mmAq	15/7.5	1200/900	FP-B120R (2 Speed) (NISHISHIBA)
ENG.RM.VENT FAN(REVERS.)	" (REV.)	2	1000/750 Nm³/min x 35/20 mmAq	15/7.5	1200/900	FP-B120R (2 Speed) (NISHISHIBA)
ENG. RM. EXH. FAN	EL. VER. AXIAL	3	200 Nm³/min x 20 mmAq	2.2	1800	FP-C55H (NISHISHIBA)
PURIF. ROOM EXH. FAN	EL. VER. AXIAL	1	100 Nm³/min x 25 mmAq	1.5	1800	FP-C55J (NISHISHIBA)
CONTROL AIR DEHYDRATOR	EL. REFRIGERATION	1	100 Nm³/h x 7 atg	-	-	NH-F100FB (HANKISON)
HOISTING CRANE	EL.	1	7 ton type HOIST TRAVEL TRAVER	5.5 1.5 1.5	1200 1800 1200	(SEKIGAHARA)
CONT.ROOM AIR COND.UNIT	EL. PACKAGED	2	14.3 x 10³ Kcal/h	3.75	3600	DP58K EL. HEATER 15KW (TOYO ENG.)
WORKSHOP AIR COND. UNIT	"	1	8.6 x 10³ Kcal/h	2.2	3600	DP37K " 9KW (")
N. B.: MATERIAL	IMPELLER FOR S.W. PUMP: PHENOLIC RESIN (WORKING), PHOSPHOR BRONZE (SPARE)					
	CASING FOR S.W. PUMP : BRONZE					

HEAT EXCHANGER

ITEM		TYPE	NO.	AREA (m^2)	F.W. or OIL SIDE FLOW	F.W. or OIL SIDE TEMP.	S.W. SIDE FLOW	S.W. SIDE TEMP.	REMARKS
CENTRAL	F.W. CLR	PLATE	2		450 m³/h	48.1	475	32	(HISAKA)
MAIN	L.O. CLR	PLATE	2			45	150(F.W.)	37	(HISAKA)
CAMSHAFT	L.O. CLR	SHELL & TUBE	1	8	12	45	5 (F.W.)	37	(MITSUI)
STERN TUBE	L.O. CLR	SHELL & TUBE	1	2.5	2	45	5 (F.W.)	39.5	(MITSUI)

ITEM	TYPE	NO.	AREA	S.W. FLOW	S.W.TEMP	REMARKS
AUX. CONDR	SHELL & TUBE	1	170 m^2	800 m³/h	27°C	Tube: Cu-Ni (MITSUI)
DRAIN COOLER	SHELL & TUBE	1	2 m^2	10 m³/h	32°C	Tube: Cu-Ni (MITSUI)

ITEM	TYPE	NO.	AREA	FLOW	TEMP.	ST. PRESS.	REMARKS
MAIN ENG. F.O. HTR	HOR. STEAM	3	-	5,500 L/h	125→150°C	5.5 atg	M6L7x40-250 (GADELIUS)
BLEND. F.O. HTR	HOR. STEAM	1	-	1,680 L/h	100→135°C	5 atg	XLV90-200 (GADELIUS)
BLR F.O. HTR	HOR. STEAM	1	-	1,100 L/h	55 →125°C	5 atg	XLV90-200 (GADELIUS)
PURIF. F.O. HTR	HOR. STEAM	2	-	4,410 L/h	50 →110°C	1.8 atg	M6L7X40-250 (GADELIUS)
PURIF. L.O. HTR	HOR. STEAM	2	-	4,200 L/h	45 → 80°C	1.8 atg	XLV90-250 (GADELIUS)
AUX. L.O. PURIF. HTR	HOR. STEAM	1	-	800 L/h	45 → 80°C	1.8 atg	XLV90-75 (GADELIUS)
M/E F.W. PRE-HEATER	HOR. STEAM	1	-	35 m³/h	60 → 70°C	5 atg	BHR150/40x25-20 (GADELIUS)

N. B. :

FRESH WATER GENERATOR	NO. OF SET: 1 TYPE: JWSP-36-C100 FLASH, 4.3 RPM (USPH) CAPACITY: 35 TON/DAY
	MAKER: NAGASE-ALFA REMARKS: EJECTOR PUMP: 84 m³/h x t38m, 20 KW x 3,000 RPM; DISTIL. PUMP: 21 m³/h x t28m, 0.65 KW x 3,600 RPM
BILGE SEPARTOR	NO. OF SET: 1 TYPE AUTODRAINAGE, HSN-5F CAPACITY: 5 m³/h
	MAKER: HEISHIN REMARKS: 15 PPM with Oil Content Alarm and Steam Heater

TANKS & RESERVOIRS

ITEM	NO.	CAPACITY	REMARKS	ITEM		NO.	CAPACITY	REMARKS
MAIN AIR RESERVOIR	2	23.5 m^3	30 atg	HEAVY F.O.	SETT. TK	2	115 m^3	H.C. S.S.
					SERV. TK	1	115 m^3	H.C. S.S.
AUX. AIR RESERV.	1	0.15 m^3	30 atg	D.O.	SETT. TK	1	20 m^3	S.S.
					SERV. TK	1	20 m^3	S.S.
CONTROL AIR RESERVOIR	1	3 m^3	7 atg	BLR	D.O. TK	1	1.6 m^3	
SHIP SERV. AIR RESERV.	1	3 m^3	9 atg					
EMERG. AIR RESERV.	1	0.2 m^3	9 atg	FUEL OIL DRAIN TANK		1	40 m^3	H.C. D.B. S.S.
FWD. EMERG. AIR RESERV.	1	0.1 m^3	9 atg					

TANKS

ITEM		NO.	CAPACITY	REMARKS	ITEM	NO.	CAPACITY	REMARKS
TURBO GEN LO	STOR. TK.	1	1.0		F.W. EXPANSION TANK	1	1.0	
	RENOVAT.TK	1	1.0					
MAIN ENG. LO	STOR. TK.	1	41	S.S.	PURIF. OPE. W. TK.	3	0.05	
	STUFF LO TK	1	3.0	H.C.				
GEN. ENG. LO	STOR. TK	1	4.5		ATMOS. DRAIN TANK	1	3.0	
	SETT. TK	1	1.2	H.C.				
CYL. O.	STOR. TK.	1	5.2	SS.	CLEAN DRAIN TANK	1	5	D.B. SS.
	MEASURE TK	1	0.8		BILGE TANK	1	45	S.INJ. H.C.SS.DB.
BTM	L.O. DRAIN TK	1	41	SS. D.B. HC	WASTE OIL TANK	1	15	
	L.O. RESERV. TK	1	41	SS. D.B. HC	WASTE OIL SERVICE TANK	1	0.5	
CAMSHAFT L.O. TK.		1	0.75		F.O. SLUDGE TANK	1	1	S.INJ. SS.
L.O. DRAIN TK.		1	0.5		L.O. SLUDGE TANK	1	2	S.INJ. SS.
STUF. BOX L.O. DRAIN TK		1	2.5	H.C.	AIR CLR CLEAN. W. TK.	1	1.5	S.INJ.
SCAV. BOX L.O. DRAIN TK.		1	0.2	S. INJ.	ENG. ROOM SEWAGE TK.	1	8	
FILTER L.O. DRAIN TK.		1	0.06		DISTILLED W. TK.	1	22	SS.
STERN TUBE L.O. DRAIN TK		1	2	SS. D.B.	SOOT CLEAN. W. TK.	1	20	SS.
STERN TUBE L.O. HEAD TK.		1	0.2		EMERG. GEN. F.O. TK.	1	0.95	
STERN TUBE SEAL O. TK.		1	0.01		D.O. SLUGE TANK	1	1	STM INJ.

WORK SHOP

ITEM	TYPE	NO.	CAPACITY	KW	RPM	REMARKS
UNIVERSAL MACHINE TOOL	E1.COMBI (LATHE & DRILL)	1	BED L x W : 1920 x 330	2.2	1,800	DUM-2GA-2 (DAINICHI)
GRINDER	E1. TWIN HEAD SM-10	1	255ø	0.75	1,800	(DAINICHI)
ELECTRIC WELDER	A.C. ARC WELDER	1	300A	-	-	
GAS WELDER	O_2, C_2H_2	1	O_2 : 3 BOTTLES C_2H_2: 2 BOTTLES	-	-	(DREW AMEROID)

AUXILIARIES (OUTSIDE ENG. ROOM)

ITEM	TYPE	NO.	RPM	CAPACITY	SHP KW	INLET STEAM PRESS	INLET STEAM TEMP.	EXH.	W.R.	REMARKS
AIR COND. REF. COOL. S.W. PUMP	EL.VER.CENT.	1	1,800	90m³/hxT20m	7.5KW					SVS125S (SHINKO)
PROV. REF. MACH. COOL. S.W. PUMP	EL.HOR.CENT. SELF. PRIM.	1 / 1								
FORWARD FIRE & G.S. PUMP	EL.VER.CENT.	1	1,800	175m³/hxT88m	70 KW					
FRESH WATER PUMP FOR ACCOM. SPACE	EL.VER.CENT.	2	3,600	13m³/hxT55m	5.5KW					
HOT W. CIRC. PUMP	EL.VER.CENT	1	1,800	4m³/h x T5m	0.4KW					GV32 (SHINKO KINZOKU)
DRINK.WATER STERILIZER	U.V. TYPE	2		11.4 m³/h						(BULL & ROBERTS BR-3000A

DECK MACHINERIES & OTHERS

ITEM	TYPE	NO.	CAPACITY	KW	RPM	STEAM PRESS.	REMARKS
STEERING GEAR	EL. HYD.	1	233 t-m	75 x 2 sets	1200		DF-250 (MITSUBISHI)
WINDLASS	EL. HYD.	2	25 ton x 9 m/min.	95 x 2 sets	1800		K7681III-W320 (FUKUSHIMA)
MOORING WINCH	EL. HYD.	4	20 ton x 15 m/min		1800		W320-R/NV W320-L/NH (FUKUSHIMA)
ACCOM. LADDER WINCH	EL.	2		3.7	1740		NAKASEISAKUSHO)
OUKIT HOIST LADDER WINCH	EL.	2		2.2	1740		(CHUO KOGYO)
BOATS'N STORE CRANE	EL.	1	1.6ton x 10m/min.		1740 1710		VE/1.6/9500 (DODWELL)
ENG. ROOM CRANE	EL.	1	7 ton x 10 m/min.		1735 1750		VE/7/1000 (DODWELL)
PROV. REFRIGERATOR	EL. RECIPRO	2	4300 Kcal/h	5.5	1500		5F20 (U.S. CARRIER)
AIR COND. REFRIGERAT.	EL. RECIPRO	2	268000 Kcal/h	75	1770		5H80 (U.S. CARRIER)
VALVE REMO-CONT. SYS.	HYD.	1	8.15L/min.x105bar	2.2	1725		(DANFOSS)
W/T SLIDING DOOR	EL. HYD.	1					(WALK & KRENZER INC.)
FORE SIDE PORT SIDE DOOR	EL. HYD.	1					(NAKA IRON WORKS)
BOWTHRUSTER	EL.	1		1200PS	1180		2000/MSB (MITSUBISHI)
LIFE BOAT	DIESEL DRIVEN	2	44 PERSONS	30 HP	-		HBW250-2R (SABB)
ELEVATOR	EL.	2	6 PERSONS 500 kg	7.5 3.7	1150 1150		AC-2 AC-1 (NIPPON ELEVATOR)
DUMBWAITER	EL.	1	80 kg	0.4			(NIPPON ELEVATOR)
BOAT DAVIT	EL.	2	7.5 ton	15 HP	1660		(SCHAT DAVIT)
SEWAGE TREAT UNIT		1	3600 GALLONS/DAY		3450		(OMNIPORE)
HOLD FAN	EL.	20	630 m³/min.	18.5	1750		(NISHISHIBA)

AUTOMATION & INSTRUMENTATION

CONTROL ROOM	PORT FOREMOST ON THE 2ND DECK
MAIN ENGINE	REMOTE CONTROL, C/R, W/H, WINGS
AUX. BOILER	BURNER: REMOTE AUTO SEQUENTIAL ACC ADJUST: C/R LOCAL
	SOOT BLOWER: MANUAL
EXH. GAS ECONOMIZER	
	SOOT BLOWER: REMOTE SEQUENTIAL
GENERATING PLANT	STARTING: REMOTE / AUTO SYNCHRONIZING: AUTO / LOCAL
	LOAD SHEARING: AUTO / LOCAL POWER MANAGEMENT SHALL BE APPLIED.
OIL PURIFIER	(F.O.) STARTING: REMOTE / LOCAL SLUDGE CONTROL: ONE TIMER PER 1 SET
	ALARM:
	(L.O.) STARTING: REMOTE / LOCAL SLUDGE CONTROL: ONE TIMER PER 2 SETS
	ALARM:
	(D.O.) STARTING: LOCAL SLUDGE CONTROL: ONE TIMER PER 1 SET
TEMP. CONTROL	M/E: L.O., F.O., CAMSHAFT L.O., JACKET COOL. F.W. CENT. F.W. CLR: F.W. T.GEN.:L.O. GEN. ENG.: L.O.,F.O.,JACKET COOL.F.W.PURIF.:L.O.&F.O.AUX.BLR:F.O.EXH.GAS ECO.FEED H.F.O.SETT.TKS
VISCOCITY CONTROL	SUPPLIED FOR MAIN ENGINE
LEVEL CONTROL	BLR STEAM DRUM, ATMOS. DRAIN TK, STEAM FLASHER, AUX. COND., PURIF. OPE. W. TK H.F.O. SERV. TK, D.O. SETT. TK.
REMOTE CONTROL	M/E, GEN. ENGINES, MAIN, TOP-UP, SHIP SERV., CONT. AIR COMPS, VITAL POUMPS, AUX BLOWERS
AUTO START/STOP	GEN. ENGINES, MAIN, TOP-UP, SHIP SERV., CONT. AIR COMPS, AUX BLOWERS, VITAL PUMPS
INSTRUMENTS	M/E PERFORMANCE MONITORING SYSTEM: MIP CALCULATION, DATA STORAGE & TREND
	FUEL CALCULATION, DATA COMPARISON, MIMIC DIAGRAM, RUNNING HOUR INDICATION
	TORSION METER PROVIDED (MAKER: EEL)
	F.O. FLOW METER: CONSUMPTION OF ALL H.F.O. & D.O. SHALL BE MEASURED.

MISCELLANEOUS

FILTER	AUTO BACKWASH F.O. SECONDARY FILTER, AUTO L.O. DISCHARGE FILTER
	CARTRIDGE FILTER FOR L.O. FINE FILTER AND GEN. ENG. L.O. BYPASS FILTER
PIPING MATERIAL	S.W. COOLING: Cu-Ni F.W. COOLING: WELDED STEEL (SCH. 40)
	BILGE FIRE: WELDED STEEL (SCH. 40) GALV.
	BALLAST : WELDED STEEL (SCH. 40) GALV.
	FRP PIPES ARE USED WITHIN THE BALLAST TANKS
GENERAL REMARKS	

P- 1/9

APPROVAL OF OWNER & REGULATORY BODIES						
ALT. NO.	OWNER		ABS			
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	22 Mar 1985		19 Apr 1985			
A	22 May 1985		12 JUL 1985			

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. **1325** — SHIP'S NAME **TILLIE LYKES**

OUTFIT DESIGN SECT. (HULL OUT FITT.)

ARRANGEMENT OF FORWARD MACHINERY SPACE & A/C UNIT RM
前部機械室及びA/C UNIT室
全体装置

DATE (TEL 2235)

JOB NO. TS1323/24/25 — SCALE 1/50 — LYKES REF. NO. 400004 — MITSUI DRAWING NO. 4A16915 — REV.

(9 SHEETS WITH COVER)

2

PLAN RECORD			
REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5 OCT 1986	PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	S. Nishizaki

P- 3/9

TABLE OF SYMBOL

	PLAN	SECTION	REMERKS
FLOOR PLATE & GRATING			CHECKERED PLATE
STEP			
LADDER			LADDER WITH DUST SHIELD
		ELEVATION	LADDER
TERMINAL OF VENT.DUCT			FIXED DIRECTIONAL TYPE
	FIRE DAMPER		

DWG NO. 4A16915

4/9

GENERAL NOTE

1. REFERENCE
   DWG NO. 1100081-A "GENERAL ARRANGEMENT"
   DWG NO. 4A16916 "REMOVAL PROCEDURE OF EQUIPMENTS IN FORWARD MACHINERY SPACE" (OWNER'S REFERENCE)

DWG.NO. 4A16915

1387

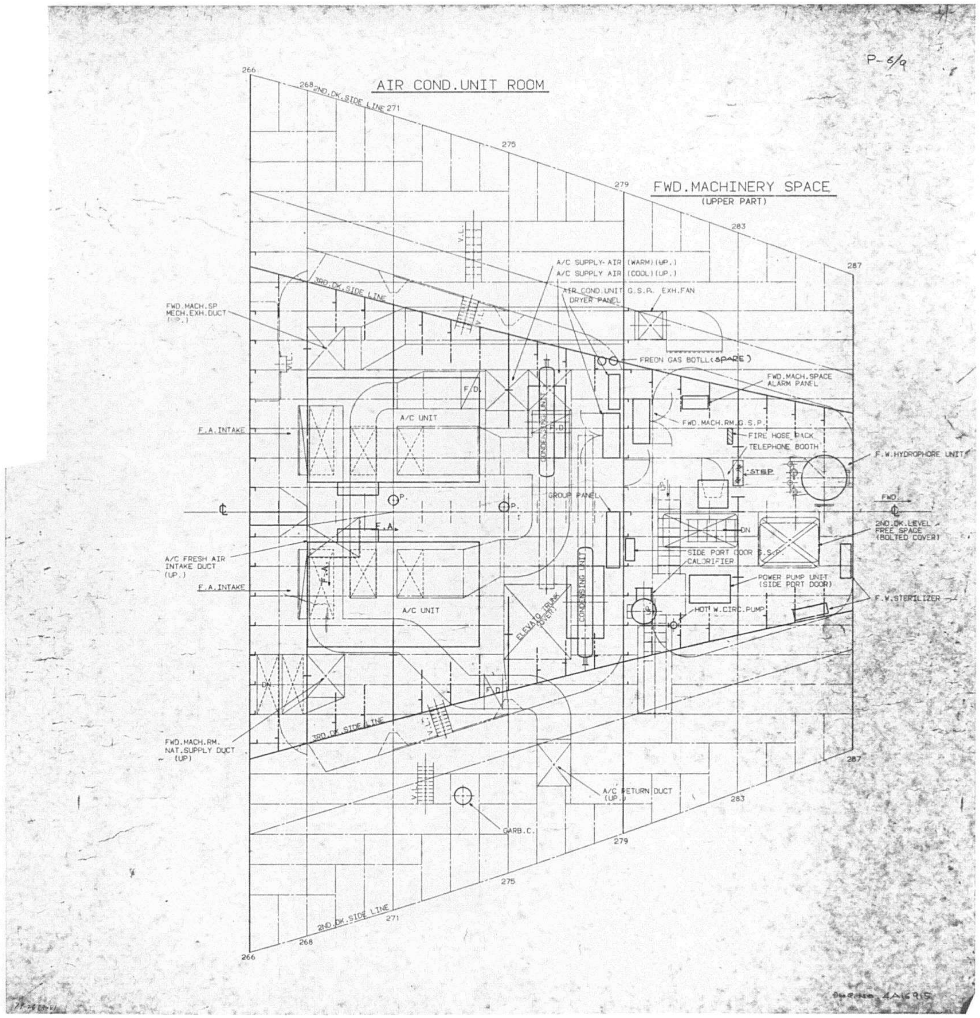
TS 1323 IN FWDMACHINERY SPACE & AIR COND. UNIT RM. P- 5/9

PRINCIPAL PARTICULARS OF MACHINERIES

NO.	SERVICE	TYPE	PARTICULAR					NO. OF. REQ.	REMARKS
			CAPACITY m^3/H	SIZE					
				DIS. PRESS. Kg/cm^2	SUC. HEAD m	MOTOR KW	MOTOR RPM		
	FWD. FIRE & G/S PUMP	EL. V. CENT. SELF - PRI	175	88	-5	70	1800	1	TYPE: GPV160-2S
	AIR CONDITION REF. COOLING S.W. PUMP	DITTO	90	1.5	-5	7.5	1800	1	SVS125S
	NO. 1 PROV. REF. COOLING S. W. PUMP	EL. H. CENT. SELF - PRIM	6.5	1.5	-5	2.2	3600	1	AHJ-50-2
	NO. 2 PROV. REF. COOLING S. W. PUMP	DITTO	30	35	-5	7.5	3600	1	AHJ-70-2
	HOT W. CIRCULATING PUMP	EL. V. CENT.	4	TOTAL HEAD 5 m		0.4	1800	1	GV-32
	F. W. HYDROPHORE UNIT	VERT. TANK WITH TWO PUMPS (EL. V. CENT.)	TANK : $2 m^3$ PUNP : $13 m^3/H$ x T55m x 2 SETS MOTOR : 5.5 KW x 3600 PRM					1	UH-202
	CALORIFIER	STEAM HEAT	300L	30L/min, 10 deg'c → 60 deg'c				1	
	THRUSTER (EL. DRIVEN)	2000/MSB	—	—	—	920	1200	1	
	P. UNIT FOR THRUSTER	EL. HYD.	35 ℓ/MIN.	35	—	3.7	1200	1	
	F. W. STERILIZER	ULTRA-VIOLET WATER PURIFICATION	11.4	—	—	—	—	2	
	SEAWAGE TREATMENT PLANT	ELECTROCATA-LYTIC WATER TREATMENT	3600g/day 13824ℓ/day	—	—	—	—	1	12M812-27
	AIR COND. CENT. UNIT	—	ABT. 29500	static. P. 276 mmAg	—	37	1800	2	
	AIR COND. CONDENSING UNIT	—	—	—	—	75	1800	2	

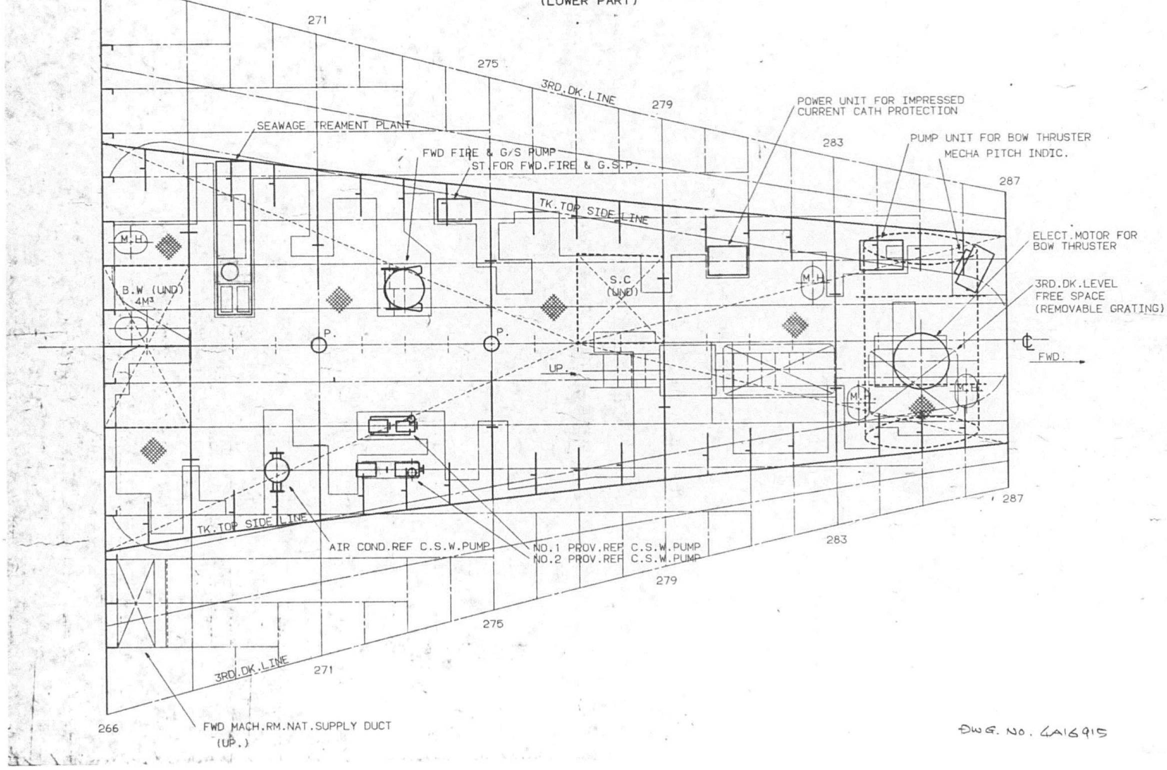
DWG. NO 4A16915

1388

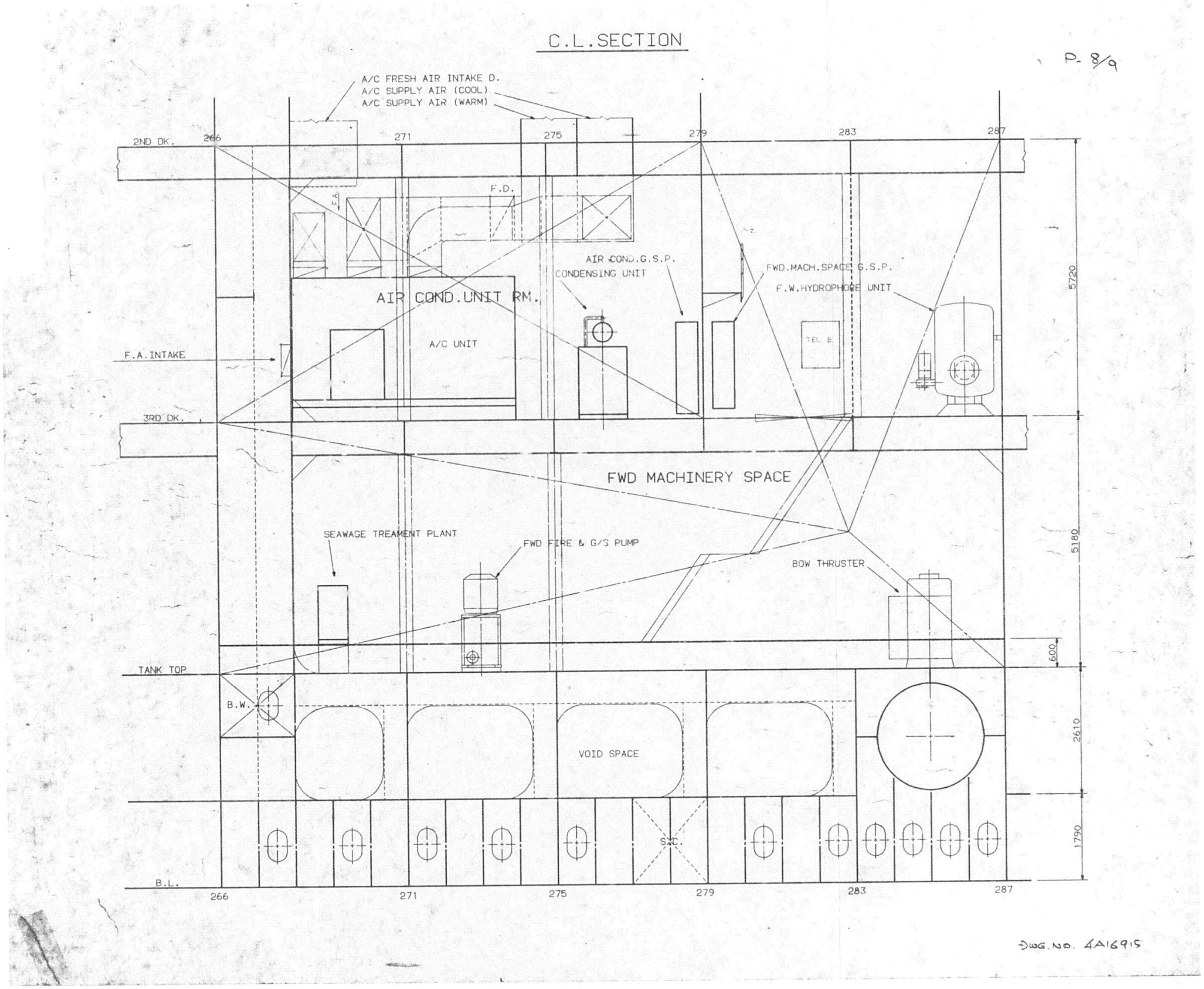

P-6/9
AIR COND. UNIT ROOM
FWD. MACHINERY SPACE
(UPPER PART)
2ND. DK. SIDE LINE
3RD. DK. SIDE LINE
A/C SUPPLY AIR (WARM)(UP.)
A/C SUPPLY AIR (COOL)(UP.)
AIR COND. UNIT G.S.P. EXH. FAN
DRYER PANEL
FREON GAS BOTLL (SPARE)
FWD. MACH. SPACE ALARM PANEL
FWD. MACH. SP MECH. EXH. DUCT (UP.)
F.A. INTAKE
A/C UNIT
FWD. MACH. RM. G.S.P.
FIRE HOSE RACK
TELEPHONE BOOTH
F.W. HYDROPHORE UNIT
GROUP PANEL
FWD
2ND. DK. LEVEL FREE SPACE (BOLTED COVER)
A/C FRESH AIR INTAKE DUCT (UP.)
SIDE PORT DOOR G.S.P.
CALORIFIER
POWER PUMP UNIT (SIDE PORT DOOR)
F.W. STERILIZER
HOT W. CIRC. PUMP
ELEVATOR TRUNK
CONDENSING UNIT
FWD. MACH. RM. NAT. SUPPLY DUCT (UP)
A/C RETURN DUCT (UP.)
GARB. C.
266
268
271
275
279
283
287

1389

FWD. MACHINERY SPACE
(LOWER PART)

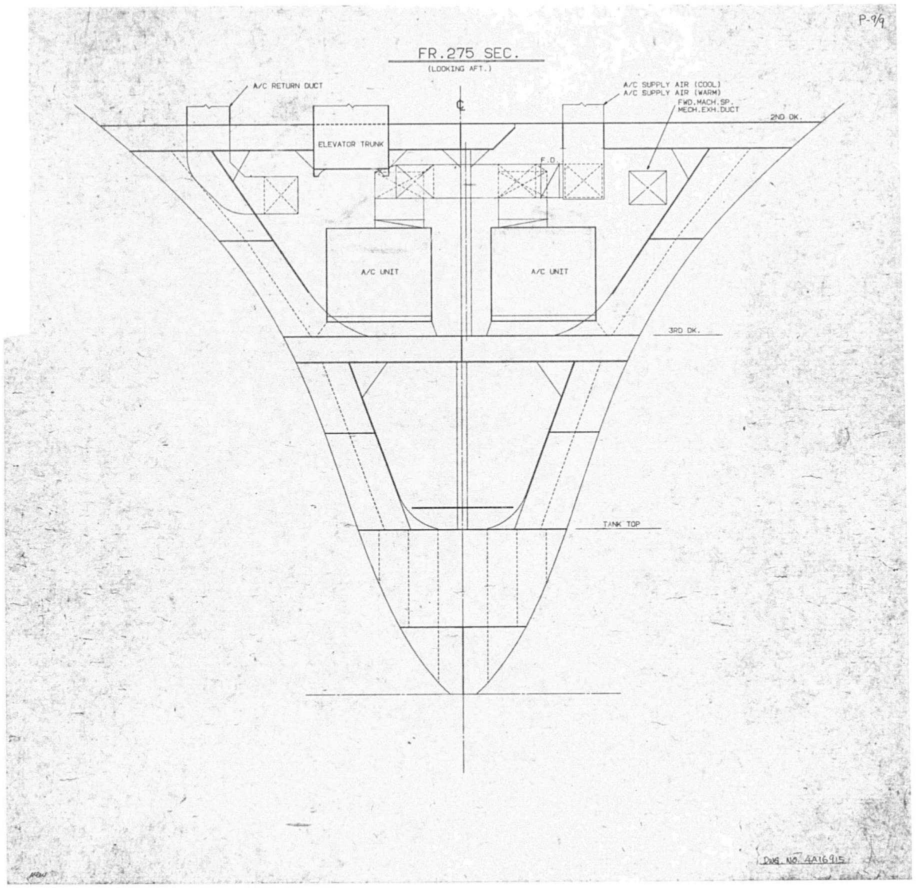


1390



C.L.SECTION
P- 8/9
A/C FRESH AIR INTAKE D.
A/C SUPPLY AIR (COOL)
A/C SUPPLY AIR (WARM)
2ND DK.
3RD DK.
TANK TOP
B.L.
266
271
275
279
283
287
F.D.
F.A.
AIR COND.UNIT RM.
A/C UNIT
F.A.INTAKE
AIR COND.G.S.P.
CONDENSING UNIT
FWD.MACH.SPACE G.S.P.
F.W.HYDROPHORE UNIT
TEL.B
FWD MACHINERY SPACE
SEAWAGE TREAMENT PLANT
FWD FIRE & G/S PUMP
BOW THRUSTER
B.W.
VOID SPACE
S.C.
5720
5180
600
2610
1790
DWG.NO. 4A16915

1391


P-9/9
FR.275 SEC.
(LOOKING AFT.)
A/C RETURN DUCT
A/C SUPPLY AIR (COOL)
A/C SUPPLY AIR (WARM)
FWD.MACH.SP.
MECH.EXH.DUCT
2ND DK.
ELEVATOR TRUNK
F.D.
A/C UNIT
A/C UNIT
3RD DK.
TANK TOP
DWG. NO. 4A16915

1392

1/12

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	22/MAY/1985	OFTS/MES -440				

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER / OUTFIT DESIGN SECT HULL OUTFIT. SEC.CHIEF

SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

前部機械室機器搬出要領図

REMOVAL PROCEDURE OF EQUIPMENTS IN FORWARD MACHINERY SPACE.

MITSUI ENGINEERING & SHIPBUILDING CO., LTD. SHIP DESIGN DEPARTMENT — FEB. 20. 1987

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.	REV.
TS1323/4/5	1/50	400005	4A16916	

(12 SHEETS WITH COVER)

A4-4 B2-1
A3-6 B1-1

2

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5 OCT 1986	PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	S.Nishiguchi

3/12

GENERAL NOTE

1	DRAWING TO BE REFERRED
	a) ARRANGEMENT OF FWD. MACHINERY SPACE AND A/C UNIT RM. - (DWG. NO. 4A16915)

DWG.NO. 4A16916

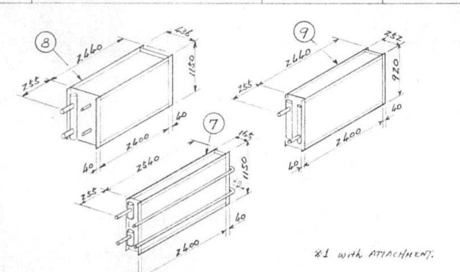
4/12

EQUIPMENTS TO BE REMOVED

ROUTE I : TO ROPE HATCH.
FOR GROUP I (EQUIPMENT No.1 TO 5). REMOVAL OF BOW THRUSTER MOTOR (AS IT IS MAX. SIZE) ARE SHOWN ON THIS DRAWING, OTHERS TO BE FOLLOWED TO THIS.

ROUTE II : TO SIDE PORT
FOR GROUP II (EQUIPMENT No.6 TO 12) REMOVAL OF A/C. UNIT AIR COOLER (AS IT IS MAX SIZE) ARE SHOWN ON THIS DRAWING, OTHERS TO BE FOLLOWED TO THIS.
FOR SMALL EQUIPMENT, BOTH ROUTE I AND II ARE AVAILABLE.

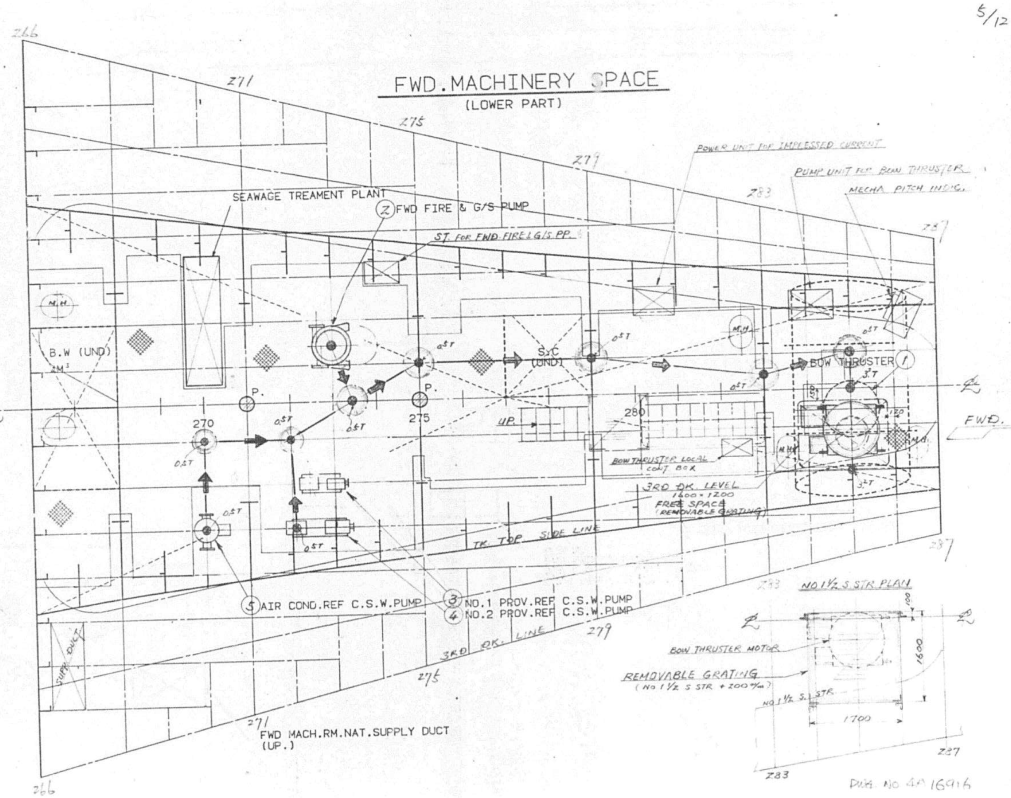
NO.	NAME	SIZE (mm)	WEIGHT
	《FWD. MACH. SPACE》		
1	BOW THRUSTER MOTOR	1000$^{\phi}$ × 2165 *1	3200 kg
2	FIRE & G.S. PUMP MOTOR	550$^{\phi}$ × 892	400 kg
3	NO.1 PROV. REF. C.S.W.P. MOTOR	190$^{\phi}$ × 325	22 kg
4	NO.2 " " "	275$^{\phi}$ × 450	48 kg
5	AIR COND. REF. " "	450$^{\phi}$ × 866	330 kg
	《AIR COND. UNIT ROOM》		
6	A/C. UNIT FAN MOTOR	370$^{\phi}$ × 713	138 kg
7	" PREHEATER (REF. BELOW)	1150 × 3795 × 165	96 kg
8	" AIR COOLER (")	1150 × 3695 × 436	390 kg
9	" REHEATER (")	920 × 3695 × 262	93 kg
10	" COMPRESSOR MOTOR	450$^{\phi}$ × 866	380 kg
11	" CONDENSOR	500$^{\phi}$ × 2660	580 kg
12	GAS BOTTLE	230$^{\phi}$ × 1300	23 kg

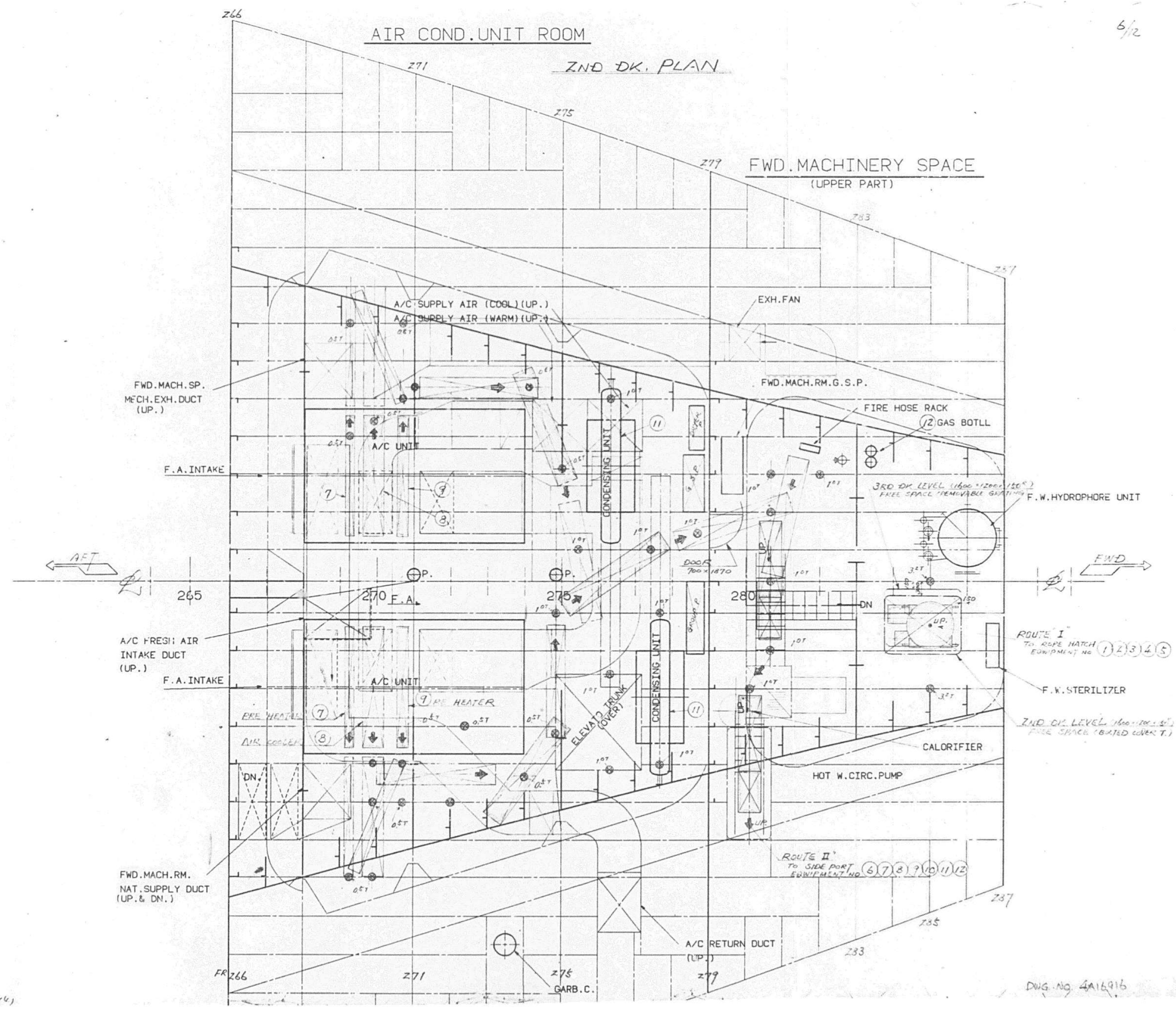


*1 with ATTACHMENT.

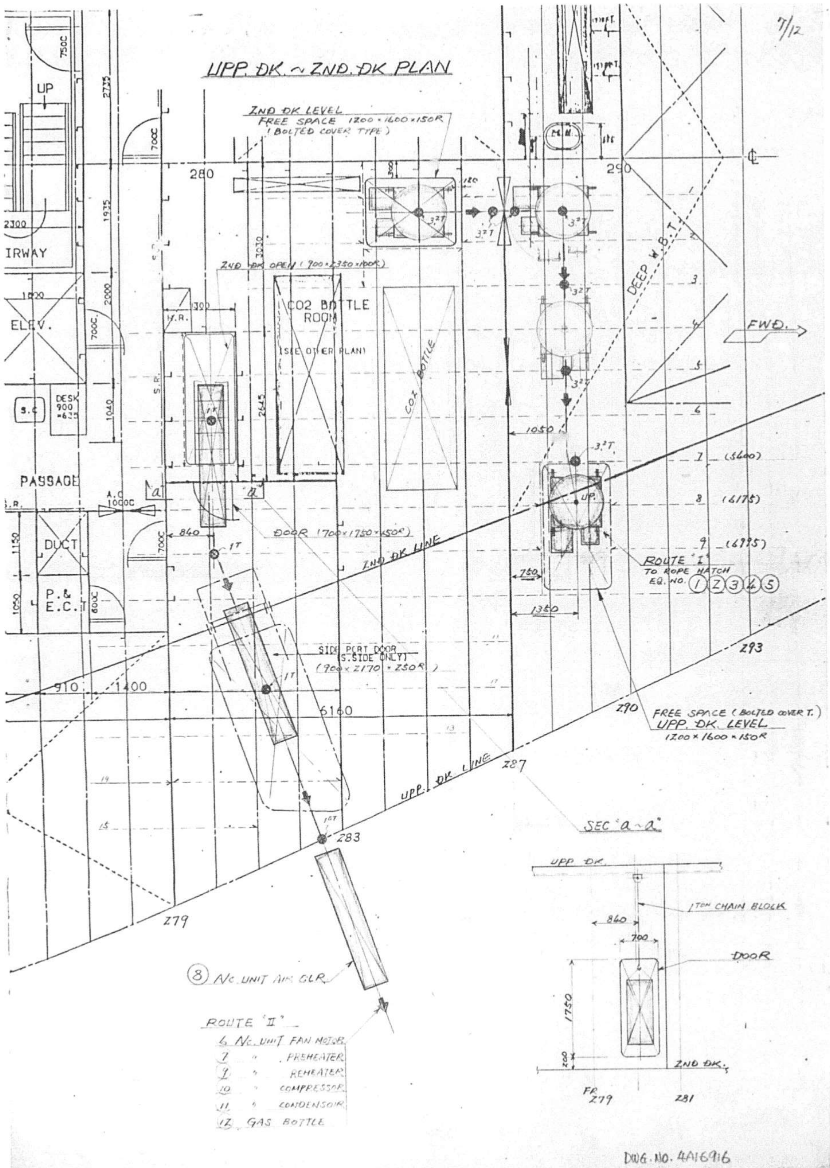
三井造船株式会社 DWG.NO. 4A16916

1393

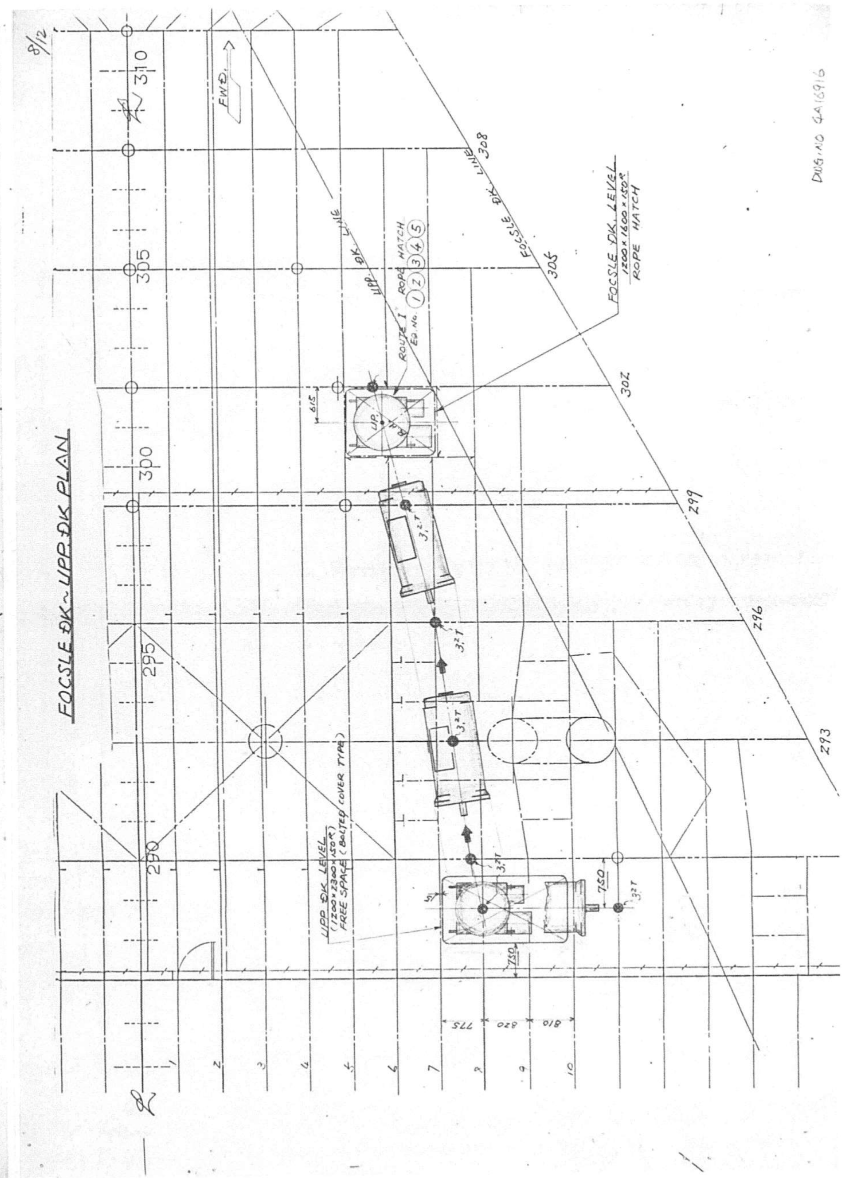

FWD. MACHINERY SPACE
(LOWER PART)
SEAWAGE TREAMENT PLANT
2 FWD FIRE & G/S PUMP
B.W (UND)
S.C (UND)
BOW THRUSTER 1
UP
280
270
275
P.
TK. TOP SIDE LINE
5 AIR COND.REF C.S.W.PUMP
3 NO.1 PROV.REF C.S.W.PUMP
4 NO.2 PROV.REF C.S.W.PUMP
3RD DK. LINE
FWD MACH.RM.NAT.SUPPLY DUCT
(UP.)
FWD.
NO 1½ S STR PLAN
BOW THRUSTER MOTOR
REMOVABLE GRATING
1700
1600
5/12


AIR COND. UNIT ROOM
2ND DK. PLAN
FWD. MACHINERY SPACE
(UPPER PART)
A/C SUPPLY AIR (COOL)(UP.)
A/C SUPPLY AIR (WARM)(UP.)
EXH. FAN
FWD. MACH. SP. MECH. EXH. DUCT (UP.)
FWD. MACH. RM. G.S.P.
FIRE HOSE RACK
GAS BOTLL
A/C UNIT
F.A. INTAKE
CONDENSING UNIT
F.W. HYDROPHORE UNIT
AFT
FWD
265
270
275
280
DN
A/C FRESH AIR INTAKE DUCT (UP.)
ELEVATOR TRUNK (OVER)
F.W. STERILIZER
CALORIFIER
HOT W. CIRC. PUMP
FWD. MACH. RM. NAT. SUPPLY DUCT (UP. & DN.)
A/C RETURN DUCT (UP.)
GARB. C.
DWG. No. 4A16916

1395

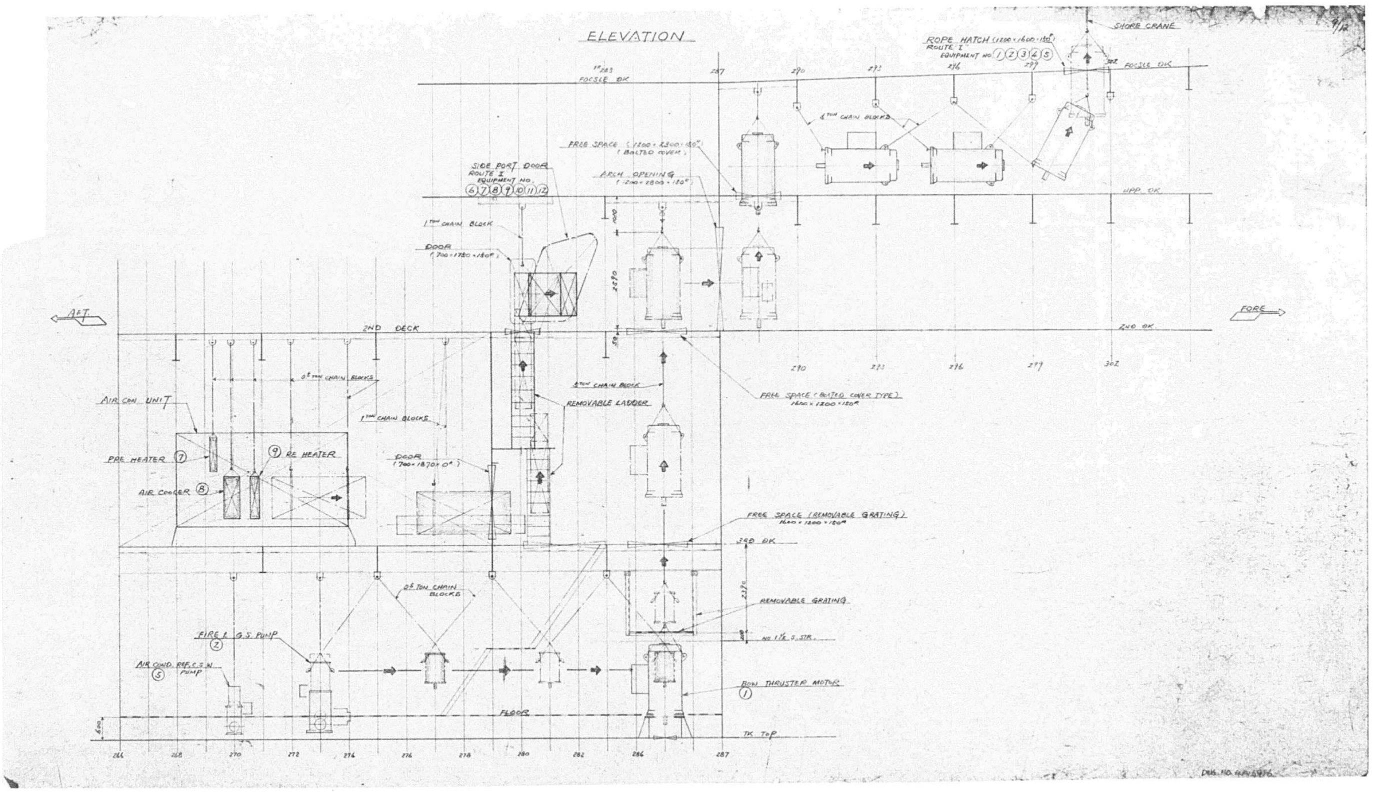


7/12
UPP. DK. ~ 2ND. DK PLAN
2ND DK LEVEL
FREE SPACE (1200 × 1600 × 150R)
(BOLTED COVER TYPE)
CO2 BOTTLE ROOM
(SEE OTHER PLAN)
CO2 BOTTLE
ELEV.
PASSAGE
DUCT
P. & E.C.
IRWAY
UP
DEEP W.B.T.
FWD.
2ND DK LINE
UPP. DK LINE
DOOR (700 × 1750 × 150R)
SIDE PORT DOOR
(S.SIDE ONLY)
(900 × 2170 × 250R)
ROUTE 'I'
TO ROPE HATCH
EQ. NO. 1 2 3 4 5
FREE SPACE (BOLTED COVER T.)
UPP. DK. LEVEL
1200 × 1600 × 150R
SEC 'a - a'
UPP DK
1TON CHAIN BLOCK
DOOR
2ND DK.
8 N.C. UNIT AIR CLR.
ROUTE 'II'
6 N.C. UNIT FAN MOTOR
7 " PREHEATER
8 " REHEATER
10 " COMPRESSOR
11 " CONDENSOR
12 GAS BOTTLE
DWG. NO. 4A16916

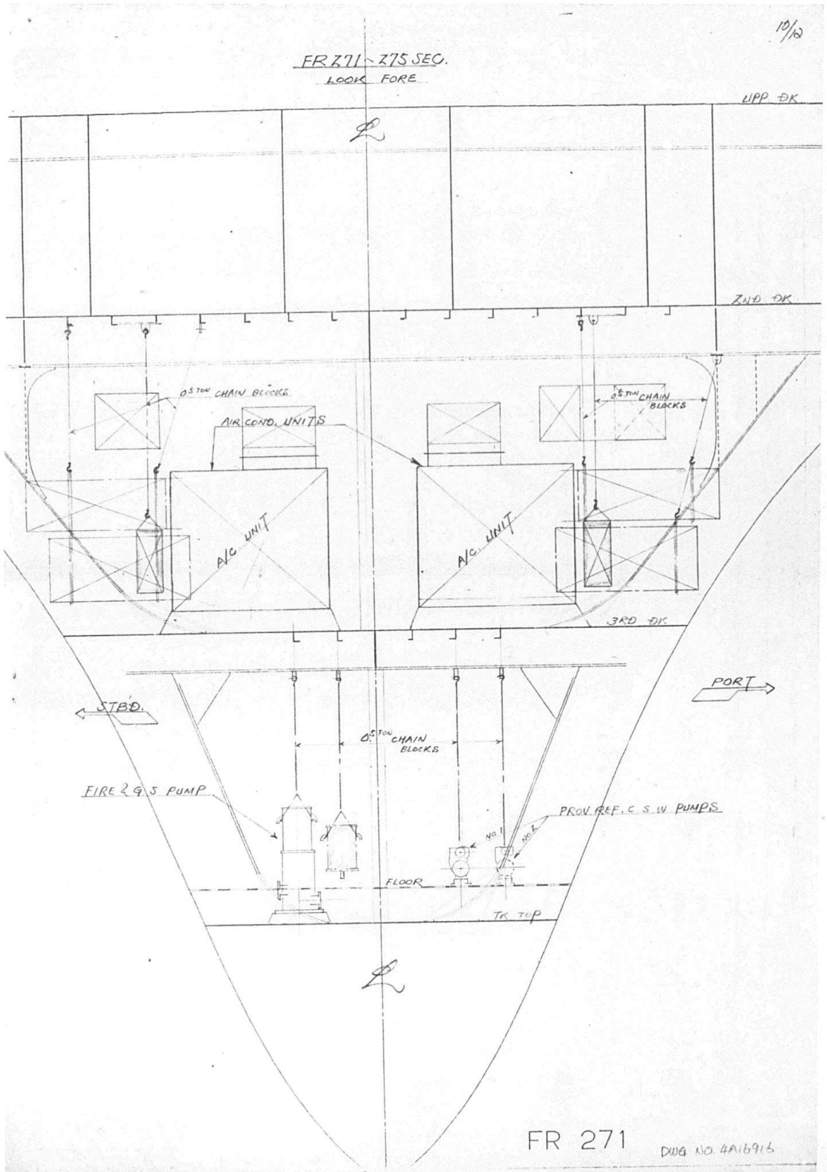


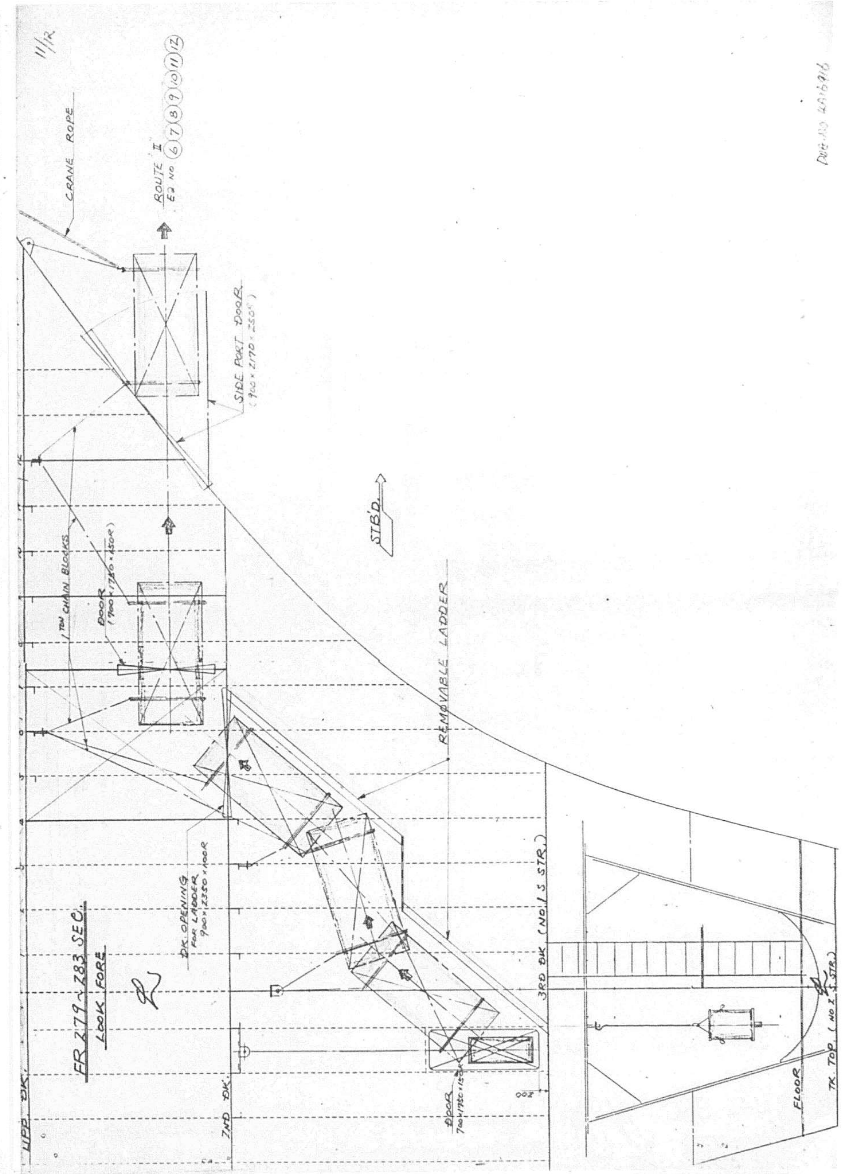
8/12
FOCSLE DK. ~ UPP. DK PLAN
FWD.
UPP. DK. LINE
FOCSLE DK. LINE
FOCSLE DK. LEVEL
1200 × 1600 × 150R
ROPE HATCH
ROUTE I
ROPE HATCH
EQ. NO. 1 2 3 4 5
UPP. DK. LEVEL
(1200 × 2300 × 150R)
FREE SPACE (BOLTED COVER TYPE)
DWG. NO. 4A16916

1396

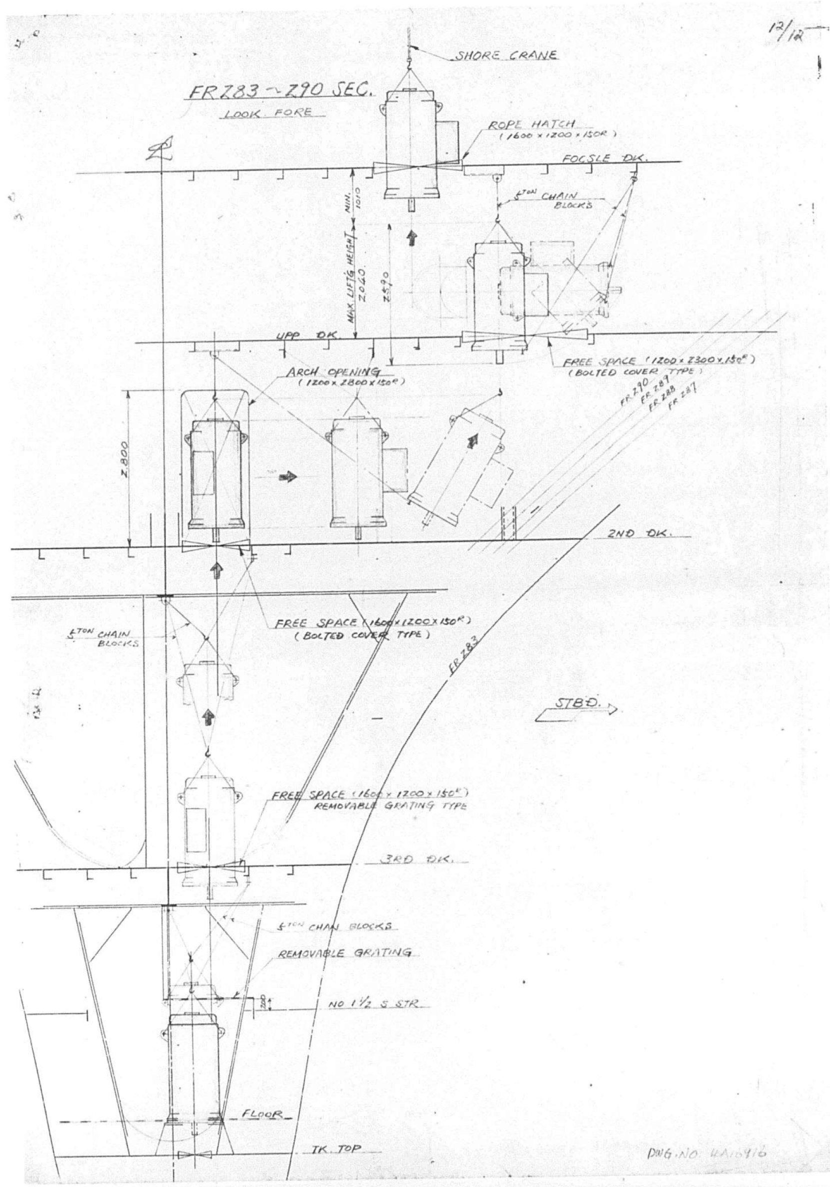

ELEVATION
ROPE HATCH
SHORE CRANE
FOCSLE DK
SIDE PORT DOOR
FREE SPACE
ARCH OPENING
UPP DK
DOOR
AFT
FORE
2ND DECK
2ND DK
AIR CON UNIT
PRE HEATER
RE HEATER
AIR COOLER
REMOVABLE LADDER
FREE SPACE (REMOVABLE GRATING)
3RD DK
REMOVABLE GRATING
FIRE & G.S. PUMP
BOW THRUSTER MOTOR
FLOOR
TK TOP

1397


10/12
FR 271 ~ 275 SEC.
LOOK FORE
UPP DK.
2ND DK.
0.5 TON CHAIN BLOCKS
AIR COND. UNITS
A/C UNIT
A/C UNIT
3RD DK.
STBD.
PORT
FIRE & G.S PUMP
PROV. REF. C.S.W PUMPS
FLOOR
TK TOP
FR 271
DWG NO. 4A16916


11/12
CRANE ROPE
ROUTE II
SIDE PORT DOOR
STBD.
REMOVABLE LADDER
FR 279 ~ 283 SEC.
LOOK FORE
UPP DK.
2ND DK.
3RD DK.
FLOOR
DWG NO. 4A16916

1398


12/12
SHORE CRANE
FR283 ~ 290 SEC.
LOOK FORE
ROPE HATCH
(1600 x 1200 x 150R)
FOC'SLE DK.
MIN. 1010
CHAIN BLOCKS
MAX LIFT'G HEIGHT 2040
2590
UPP DK.
FREE SPACE (1200 x 2300 x 150R)
(BOLTED COVER TYPE)
ARCH OPENING
(1200 x 2800 x 150R)
FR 290
FR 289
FR 288
FR 287
2800
2ND DK.
FREE SPACE (1600 x 1200 x 150R)
(BOLTED COVER TYPE)
CHAIN BLOCKS
FR 283
STBD.
FREE SPACE (1600 x 1200 x 150R)
REMOVABLE GRATING TYPE
3RD DK.
CHAIN BLOCKS
REMOVABLE GRATING
NO 1½ S STR.
FLOOR
TK. TOP
DWG. NO
1399

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL								

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP Q. A. DEPARTMENT MANAGER — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

SEC. CHIEF — CHIEF — STAFF — SHIP DESIGN DEPARTMENT

SAFETY VALVE PRESSURE SETTINGS

DATE 10-Nov.'86 (TEL 2290)
JOB NO. TS1323/24/25 — SCALE — LYKES REF. NO. 400009 — MITSUI DRAWING NO. 4116560
JOBCLASSIF. NO.

(SHEETS WITH COVER)

P. 1

LIST OF RELIEF VALVE

SYSTEM	SUPPLY SCOPE	VALVE LIST NO.	DRAWING NO.	DESIGN SET PRESS. / SYSTEM PRESSURE	ACTUAL SET PRESS. OPEN	ACTUAL SET PRESS. CLOSE	REMARKS	LOCATION	TEST DATE	WITNESSED BY
AUXILIARY BOILER (MITSUBISHI)		101B	5415101	12.5 kg/cm² 5.4~12.0	F. 12.5K	F. 11.9K	S/N 431062A FUKUI SEISAKUSHO	ATTACHED ON AUX. BOILER	26. Aug. 86	ABS. MR. WAKU OW. MR. SHORMAN
		"	"	" "	A. 12.5K	A. 11.6K	S/N 431068B "	"	"	"
EXH. GAS ECONOMIZER (MITSUI)		4SV-11	5115201	12.5 kg/cm² 5.4~12.0	12.5K	11.8K	DRESSER JAPAN	SUPER HEATER STEAM OUTLET	7. Nov. 86	ABS. MR. WAKU OW. MR. SHORMAN
		3FV-42	"	18 kg/cm² 9.9~16.5	17.2K	16.0K	"	ECONOMIZER FEED WATER OUTLET	20. Oct. 86	"
		3FV-15	"	30 kg/cm² 17.5~19.5	29.0K	25.0K	"	PRE-HEATER FEED WATER OUTLET	"	ABS. MR WAKU OW. MR. SHORMAN
FLASHER (MITSUBISHI)		9E	5115301	5 kg/cm² 0.5ata~0.8atg	5.0K	4.6K	FUKUI SEISAKUSHO	ATTACHED ON FLASHER	19. Aug. '86	ABS MR. WAKU OW. MR. SHORMAN
MAIN ENG. F.O. HEATER (3 SETS)			5116721	16 kg/cm² 5.5 DO.	NO.1 16.0K NO.2 16.0K NO.3 16.0K	15.3K 15.8K 15.5K	DRESSER JAPAN	ATTACHED ON HEATER	19. Aug. '86	ABS. MR WAKU OW. MR. SHORMAN
PURIF. F.O. HEATER (2 SETS)			"	10 DO. 1.8 DO.	NO.1 10.0K NO.2 9.8K	9.5K 9.0K	"	"	"	"
L.O. PURIFIER (2 SETS)			"	10 DO. 1.8 DO.	NO.1 9.8K NO.2 10.0K	9.4K 9.5K	"	"	"	"
AUX. L.O. PURIFIER (1 SET)			"	10 DO. 1.8 DO.	10.0K	9.4K	"	"	"	"
BLENDER F.O. HEATER (1 SET)			"	10 DO. 5 DO.	10.0K	9.5K	"	"	"	"
BOILER F.O. HEATER (1 SET) (GADELIUS)			"	20 DO. 5 DO.	19.8K	19.4K	"	"	"	"
MAIN AIR RESERVOIR (2 SETS)			5117101	33 kg/cm² max. 30	No.1 32.5K No.2 32.5K	No.1 29.8 No.2 30.5	DRESSER JAPAN	ATTACHED ON RESERVOIR	4. Nov. 86	ABS. MR. WAKU OW. MR. SHORMAN
SHIP SERV. AIR RESERVOIR (1 SET)			"	10 DO. max. 9	10.1K	9.3K	"	"	"	"
CONTROL AIR RESERVOIR (1 SET)			"	8 DO. max. 7	8.0K	7.7K	"	"	"	"
AUX. AIR RESERVOIR (1 SET)			"	33 DO. max. 30	32.8K	31.5K	"	"	"	"
EMER. AIR RESERVOIR (1 SET)			"	10 DO. max. 9	10.0K	9.4K	"	"	20. Aug. 86	ABS. MR. WAKU OW. MR. SHORMAN

1400

LIST OF RELIEF VALVE

SYSTEM	SUPPLY SCOPE	VALVE LIST NO.	DRAWING NO.	DESIGN SET PRESS. SYSTEM PRESSURE	ACTUAL SET PRESS. OPEN	ACTUAL SET PRESS. CLOSE	REMARKS	LOCATION	TEST DATE	WITNESSED BY
EMERG. AIR RESERVOIR FOR FORWARD PART (1 SET)		CAV-901	5117101	10 Kg/cm² / MAX 9K	10.0K	9.4K	DRESSER JAPAN	ATTACHED ON RESERVOIR	8. July. 86	ABS. Mr. WAKU OW. Mr. SHORMAN
VALVE REMOTE CONTROL SYSTEM		VSV-100	4116310	112 Kg/cm² / 112 DO.	110 K	——	MAKER SUPPLY (110 BAR)	FLOOR IN ENGINE ROOM	28. Oct. 86	ABS. Mr. WAKU OW. Mr. MEGARRY
STEAM AND EXHAUST PIPEING DIAGRAM IN ENGINE ROOM (DWG. NO. 5131002)		1.EV-6	5233301	1.0 Kg/cm²	1.05K	0.8K		STEAM DUMP-LINE (AUX. COND. FOR T/G)	19. Aug. 86	ABS. MR. WAKU OW. MR SHORMAN
		3SV-20		10.0 Kg/cm²	10.2K	9.5K		T/G EXTRACTION STEAM	〃	〃
		2SV-2		7.2 Kg/cm²	7.2K	6.9K		6K STEAM LINE	〃	〃
		2SV-4?		4.3 Kg/cm²	4.25K	4.15K		F.W. GENE. INJECTION	〃	〃
COMPRESSED AIR PIPING DIAGRAM IN ENGINE ROOM. (DWG. NO. 513.025)		2AV-9		10 Kg/cm²	10.0K	——		9K COMPRESS AIR	4. Nov. 86	〃
		2AV-38		9.6 Kg/cm²	9.6K	——		EMERG. GENE. STARTING AIR	〃	〃
CONTROL AIR PIPING DIAGRAM IN ENG. RM. (DWG. NO. 5131025)		2CV-6		8.4 Kg/cm²	8.3K	5.8K		7K CONTROL AIR	〃	〃
BILGE & WASTE OIL DISPOSAL PIPING (DWG. NO. 5131020)		1WV-98		2.0 Kg/cm²	1.98K	1.8K		SCAV. BOX DRAIN TK	19. Aug. 86	ABS MR. WAKU OW. MR SHORMAN
FIRE G.S & BALLAST PIPING DIA. IN ENG. RM. (DWG. NO. 5131019)		2WV-27		5.0 Kg/cm²	4.8K	4.0K		FIRE & G.S. PUMP RECIRC.	4. Nov. 86	〃
FRESH WATER HYD. TANK (ENG. RM.)			5116826	6 Kg/cm² / 4K~5K	6.0K	5.2K	DRESSER JAPAN	ATTACHED TO TANK	〃	〃
FRESH WATER HYD. TANK (ACCOM.) (SHINKO KINZOKU)			DO.	6.3 Kg/cm² / 4.2K~5.8K	6.3K	6.0K	DO.	DO.	8. July. 86	ABS. Mr. WAKU OW. Mr. SHORMAN
CENTRAL CLEANING SYSTEM		FCV-100	4116108	85 Kg/cm² / 85 DO	85 K	——	MAKER SUPPLY	PARTIAL DECK IN ENGINE ROOM	16. Oct. 86	〃
MAIN AIR COMPRESSOR (3 SET)			5116102	32 Kg/cm² / MAX 30K	No.1 32K No.2 32K No.3 32K	——			4. Nov. 86	〃
TOPPING AIR COMPRESSOR (1 SET)			5116103	32 Kg/cm² / MAX 30K	32K	——			〃	〃
SHIP SERV. AIR COMPRESSOR (1 SET)			5116105	9.5 Kg/cm² / MAX 9K	9.5K	——			〃	〃
EMERG. AIR COMPRESSOR (1 SET)			5116106	32 Kg/cm² / MAX 30K	31.5K	——			〃	〃
CONTROLAR COMPRESSOR (1 SET)			5116104	8.5 Kg/cm² / MAX. 7K	8.4K	——			〃	〃

LIST OF RELIEF VALVE

SYSTEM	SUPPLY SCOPE	VALVE LIST NO.	DRAWING NO.	DESIGN SET PRESS. SYSTEM PRESSURE	ACTUAL SET PRESS. OPEN	ACTUAL SET PRESS. CLOSE	REMARKS	LOCATION	TEST DATE	WITNESSED BY
STEERING GEAR	BFE	ATTACHED TO NO.1 VALVE BLOCK	4117110.	257 Kg/cm² / 205 DO.	257K	——		STEERING GEAR ROOM	26. Sep. 86	ABS. Mr. WAKU OW. Mr. SHORMAN
	DO	ATTACHED TO NO.2 VALVE BLOCK	DO.	257 DO. / 205 DO.	257K	——		DO.	〃	〃
BOW THRUSTER	BFE	ATTACHD TO PUMP UNIT	4117150	35 Kg/cm² / MAX 35 DO.	35.0K	——		FOWARD MACHINERY SPACE	14. July. 86	ABS. Mr. WAKU OW. Mr. SHORMAN
SIDE PORT DOOR (FORE SIDE)	BFE	ATTACHD TO POWER PUMP UNIT	4120215	140 Kg/cm² / MAX 140 DO.	140K	——		FOWARD MACHINERY SPACE	8. Aug. 86	〃
FIRE LINE	BFE	WDV-12	4116122	11.3 Kg/cm² / 13.0 DO.	11.3K	10.0K		FOWARD MACHINERY SPACE	19-May-86	ABS. Mr. SAITA OW Mr. SHORMAN
	DO.	WDV-13	DO.	7.0 Kg/cm² / 7.0 DO.	7.0K	6.7K		DO.	〃	〃
DIAGRAM OF FRESH HOT W. POTABLE SEA W. & STEAM. PIPE FOR ACCOMM. SPACE		GSV-502	4116418	4.0 Kg/cm²	4.0K	3.8K		AIR COND. UNIT ROOM (THIRD DK.)	8. July. 85	ABS. Mr. WAKU OW. Mr. SHORMAN
		GSV-302	DO.	3.1 Kg/cm²	3.0K	2.9K		PROV. REF. MACH. ROOM (SECOND DK.)	〃	〃
		——	4116411	6.8 Kg/cm²	6.7K	6.0K	FOR CALORIFIER	FOWAD MACH. SPACE (THIRD DK.)	〃	〃
		——	DO.	6.5 Kg/cm²	6.3K	6.2K	DO.	ENGINE ROOM	19. Aug. 86	ABS MR WAKU OW. MR SHORMAN
F.W. PRE-HEATER		——	——	5.0 Kg/cm²	4.99K	4.8K			〃	〃

1401

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	AUG/6/85	OF-3/MES-812			AUG/6/85	T-8-2		
A					DEC/27/85	T-8-2		

FINISHED PLAN

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NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC. CHIEF
ASSIST. CHIEF
ENG'R
STAFF
DATE (TEL 2235)

主機据付装置
INSTALLATION OF MAIN ENGINE

JOB NO. TS1323/24/25	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
JOBCLASSIF. NO. E-01-90		410101	5121000

(9 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED	July/7/86
		PLAN, MADE APPLICABLE TO S.NO.1324 AND	J.M
		S.NO.1325	

DWG.NO. 5121000 (i)

REMARKS

図面関係 REFERENCE DRAWING	工作関係 WORKMAN-SHIP.
1.軸系装置 (5124200) ARRANGEMENT OF SHAFTING.	1.部品の製作は、DWG.NO 5124201による。 ALL DETAILS ARE MADE UNDER THE DRAWING DWG NO 5124201
2.主機据付装置詳細 (5121001) DETAIL OF INSTAL. OF MAIN ENGINE	
3.機関室船底構造 (2102111) DOUBLE BTM. IN ENGINE ROOM	2.符号①～㉒は、符号②に溶接しない。 THE PARTS MARKED ①～㉒ ARE NOT WELDED ON THE PART MARKED②
4.主機据付ボルト油圧締付要具は、主機要目録による。 TIGHT. TOOLS FOR HOLD. DOWN BOLT TO BE SHOWN AT LIST OF TOOLS FOR MAINE ENGINE	3.※印寸法は、現場照合の上決定のこと。 THE DIMENSION MARKED ※ SHOWS APROXIMATE VALUES AND TO BE DECIDED FINALLY WHEN FITTING ON THE VESSEL.

TS1323/4/5 5121000 (1/7)

据付ボルト締付要領
TIGHTNING METHOD OF HOLDING DOWN BOLT

1. 据付前に部品をよく清掃し、また球状接触面だけに潤滑剤を塗ること。
   Before tightning, all parts should be cleaned up and only the spherical contact surface should be coated with lubricant.

2. 据付ボルトを専用の油圧締付要具を用い、表1に示す油圧で締め付けること。
   Holding down bolt should be tightened at the oil press shown in Table 1 by exclusive hydraulic tightening tool.

3. 新しい部品を使用する際、据付ボルトを二度締め付けること。 即ち、まず初期作動油圧で締め付け、全接触面をなじませた後、ただちに今度は作動油圧で締め付ける。
   When new parts are used, holding down bolt should be tightened twice:
   At first, tighten the bolt at the initial working pressure in order to crash and smooth the contact surfaces, and then tighten the bolt at the working pressure.

4. 出航後の増し締め点検時間
   Guidance for the tightning after delivery

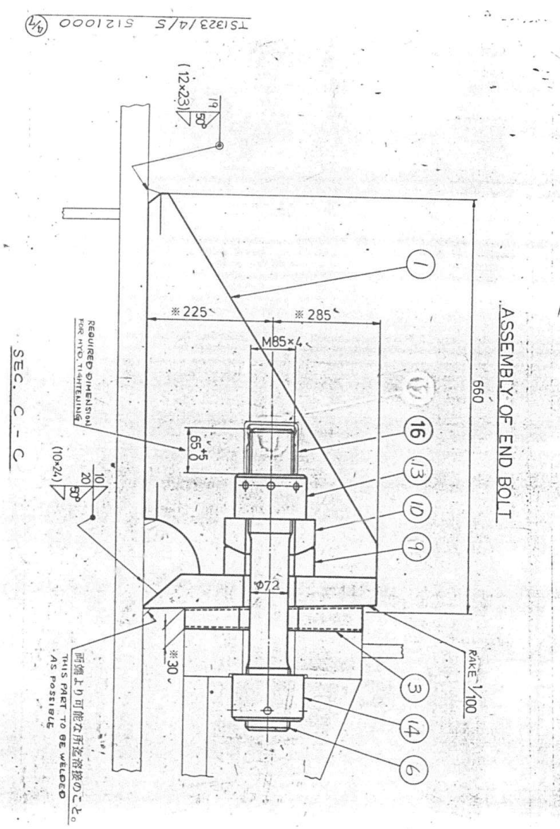
   第一回目は出航後1000時間経過時に点検し、その後は8000時間毎に点検すること。
   First check of the tightening of holding down bolt shall be carried out after 1000 hours from delivery, and the next check shall be carried out per 8000 hours.

表1 油圧締め付け要具の作動圧力
Table 1 The working pressure of the hydraulic tightening tool

	初期作動圧力 INITIAL WORKING PRESSURE (Kg/cm2)	作動圧力 WORKING PRESSURE (Kg/cm2)	ジャッキのシリンダ面積 CYLINDER AREA OF JACK (cm2)	ボルトの応力 TENSILE STRESS OF BOLT (Kg/cm2)	締付力 TIGHTENING FORCE (Kg)
スラストストッパ用 FOR THRUST STOPPER	1010	920	201.1	4544	185012
据付ボルト用 FOR HOLDING DOWN BOLT	920	920	201.1	4544	185012

TS1323/4/5 5121000 (3/7)

1402

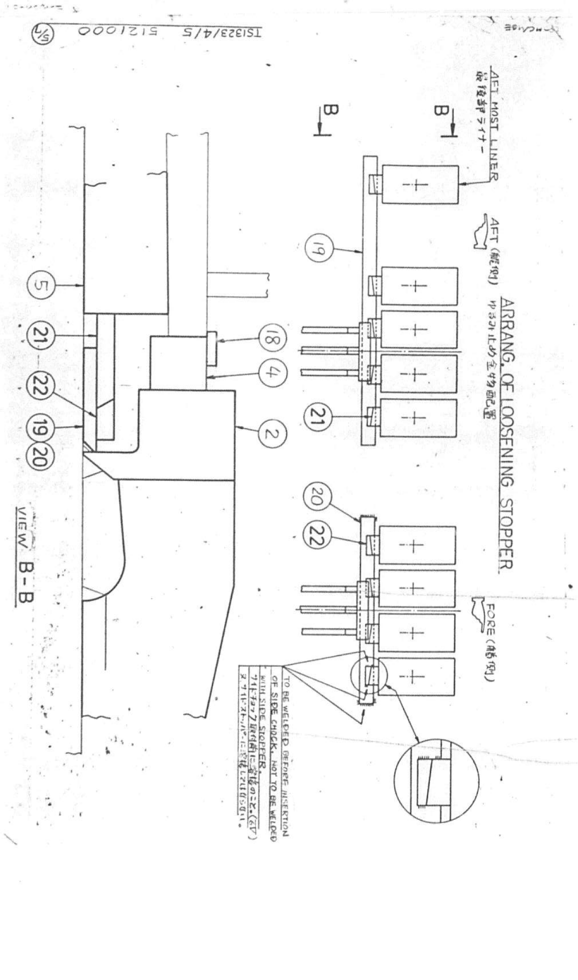


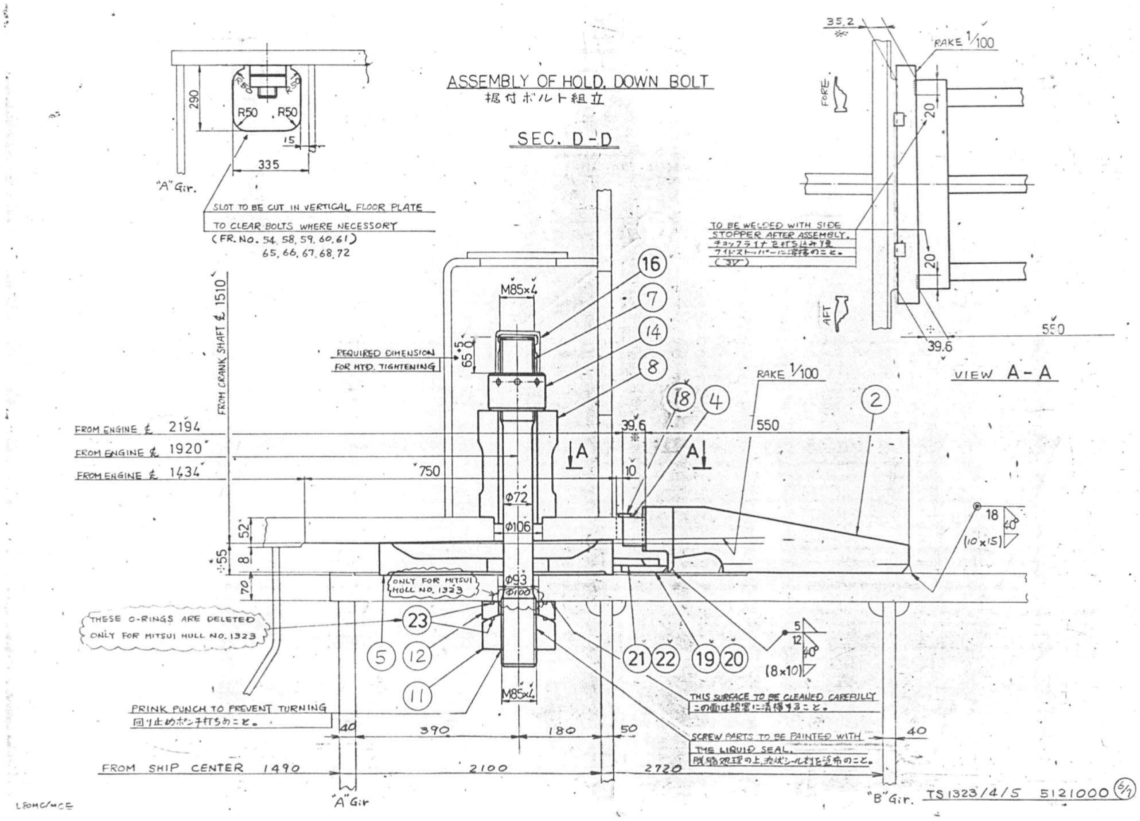
ORDER LIST

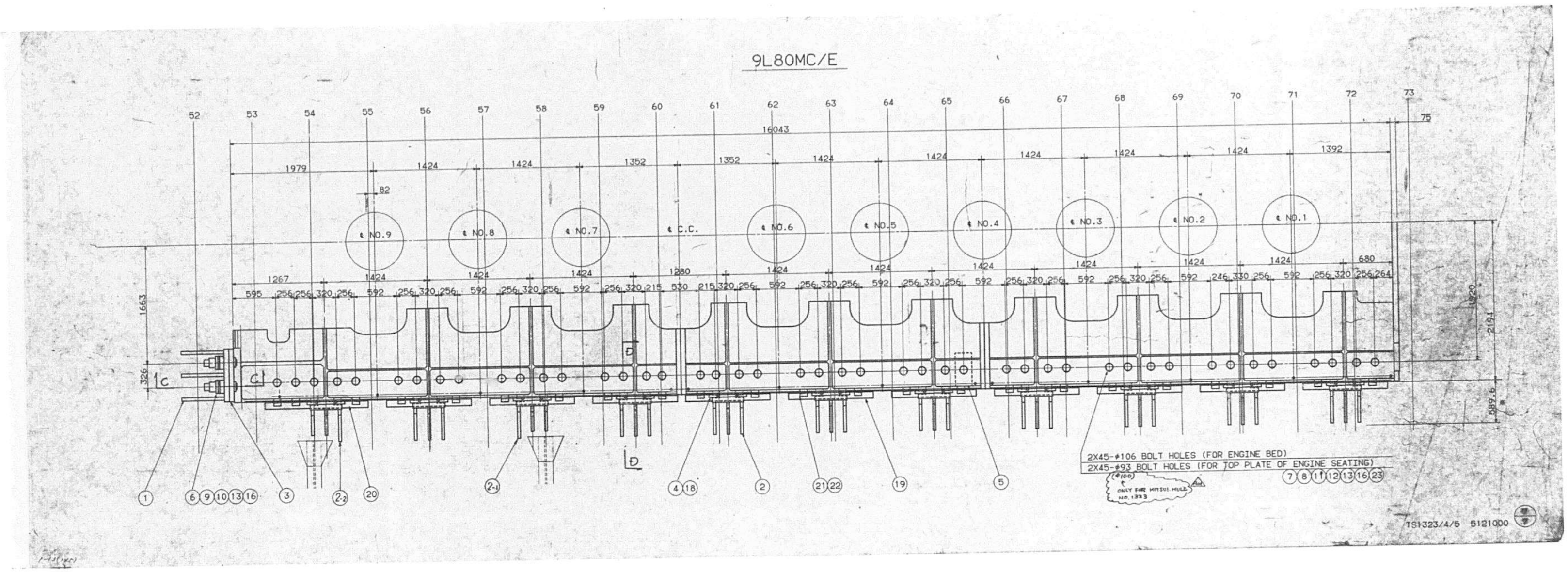
番号 NO	名称 NAME	材料 MATERIAL	試験片 TEST PIECE	常用 USE	予備 SPARE	合計 TOTAL	関係工場 WORK SHOP	1個 ONE 重量 WEIGHT (KG)	合計 TOTAL 重量 WEIGHT (KG)	記事 REMARKS
23	"O" RING	SYNTHETIC RUBBER		180		180		0.01	1.8	5221004
22	LOOSENING STOPPER	MILD STEEL SS00P		90		90		0.24	21.6	5221001
21	LOOSENING STOPPER	MILD STEEL SS00P		90		90		0.77	69.3	〃
20	LOOSENING STOPPER	MILD STEEL SS41P		2		2		9.09	18.2	〃
19	LOOSENING STOPPER	MILD STEEL SS41P		20		20		7.22	144	〃
18	STOPPER	MILD STEEL SS00P		44		44		0.05	2.2	5221001
17										
16	THREAD COVER	SYNTHETIC RUBBER		94		94		0.08	7.52	5221005
15										
14	ROUND NUT	CHROM. MOLYBD. ST SCM435		4		4		8.15	32.6	5221003
13	ROUND NUT	CARBON STEEL S45C(H)		94		94		5.91	556	〃
12	SPHERICAL SEAT	CARBON STEEL S45C(N)		90		90		5.83	525	〃
11	SPHERICAL NUT	CHROM. MOLYBD. ST SCM435		90		90		9.33	840	〃
10	SPHERICAL SEAT	CARBON STEEL S45C(N)		4		4		6.88	27.5	〃
9	SPHERICAL SEAT	CARBON STEEL S45C(N)		4		4		8.01	32.0	5221003
8	DISTANCE PIPE	DUCTILE CAST IRON FCD45		90		90		38.1	3T429	5221002
7	BOLT	CHROM. MOLYBD. ST. SCM435		90		90		28.5	2T565	5221003
6	BOLT	CHROM. MOLYBD. ST. SCM435		4		4		20.3	81.2	5221003
5	CHOCK LINER	CAST IRON FC20		90		90		52.4	4T716	5221002
4	CHOCK LINER	MILD STEEL SS41P		22		22		9.65	212	5221001
3	CHOCK LINER	MILD STEEL SS41P		2		2		72.4	145	〃
2	SIDE STOPPER	MILD STEEL SS41P		22		22		60.1	1T322	〃
1	END STOPPER	MILD STEEL SS41P		2		2		359	718	5221001

製造個数は1隻分を示す 3隻分製造のこと
QUANTITY PER SHIP IS GIVEN IN THIS TABLE MAKE FOR THREE SHIP

TS1323/4/5 5121000 (3/7)




ASSEMBLY OF HOLD. DOWN BOLT
据付ボルト組立
SEC. D-D
"A" Gir.
SLOT TO BE CUT IN VERTICAL FLOOR PLATE
TO CLEAR BOLTS WHERE NECESSORY
(FR. No. 54, 58, 59, 60, 61)
65, 66, 67, 68, 72
R50
290
335
15
FROM CRANK SHAFT ℄ 1510
REQUIRED DIMENSION
FOR HYD. TIGHTENING
M85×4
65.5
FROM ENGINE ℄ 2194
FROM ENGINE ℄ 1920
FROM ENGINE ℄ 1434
750
39.6
10
550
RAKE 1/100
VIEW A-A
TO BE WELDED WITH SIDE
STOPPER AFTER ASSEMBLY.
FORE
AFT
35.2
ONLY FOR MITSUI HULL NO. 1323
THESE O-RINGS ARE DELETED
ONLY FOR MITSUI HULL NO. 1323
φ72
φ106
φ93
φ100
PRINK PUNCH TO PREVENT TURNING
THIS SURFACE TO BE CLEANED CAREFULLY
SCREW PARTS TO BE PAINTED WITH
THE LIQUID SEAL.
FROM SHIP CENTER 1490
2100
2720
390
180
50
40
"B" Gir.
TS 1323/4/5 5121000



9L80MC/E
2X45-ϕ106 BOLT HOLES (FOR ENGINE BED)
2X45-ϕ93 BOLT HOLES (FOR TOP PLATE OF ENGINE SEATING)
TS1323/4/6 5121000

1405

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAR 4/85	OFTS/MES/236						
A	MAY 1/85	OFTS/MES/399						
B	DEC 9/85	OFTS/MES-1157						

FINISHED PLAN

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NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO.
SHIP'S NAME: TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC. CHIEF
ASSIST. CHIEF S. Nishiura
CHARGE ENG'R
STAFF
DATE

蒸気消費量表
ANTICIPATED STEAM CONSUMPTION TABLE

JOB NO. TS1323/24/25 | SCALE | LYKES REF. NO. 410501 | MITSUI DRAWING NO. 5110004
JOBCLASSIF. NO.

(SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		~~WAS~~ PREPARED FOR S.NO. 1323 AS FINISHED PLAN, APPLICABLE TO S.NO. 1324 AND S.NO. 1325	JUN. 25. 86 29

DWG. NO. 5110004

1/8

ANTICIPATED STEAM CONSUMPTION TABLE

ITEM	AT SEA IN WINTER	AT SEA IN SUMMER	IN PORT IN WINTER	REMARKS
GENERATOR TURBINE	3055	4565	6000	
BLEND F.O. HEATER	—	—	35	1695 ℓ/h 113→135°C (1set) ×1
L.O. PURIF. HEATER (SMALL)	—	—	25	800 ℓ/h 45→80°C (1set)
M/E F.O. HEATER	230	230	—	5500 ℓ/h 127→150°C (2/3set) ×1
F.O. PURIF. HEATER	175	175	—	4410 ℓ/h 50→98°C (1set)
L.O. PURIF. HEATER	115	115	—	4200 ℓ/h 45→80°C (1set)
BOILER F.O. HEATER	—	—	30	1100 ℓ/h 96→125°C (1set) ×1
H.F.O. SETTL. TANK (S)	15	5	15	115 m³ 55°C KEEPING
H.F.O. SETTL. TANK (P)	45	40	20 (KEEPING ONLY)	115 m³ 3.4 m³/h, 45→55°C HEAT UP + KEEPING
H.F.O. SERV. TANK	—	—	35	115 m³ 85°C KEEPING
NO.3 AFT WING F.O. TANK (PORS)	—	—	383	540 m³ 45°C KEEPING
DEEP F.O. TANK (S)	305	105	305	535 m³ 5→45°C HEAT UP IN 96HRS
DEEP F.O. TANK (P)	180 (KEEPING)	70 (KEEPING)	285 (HEAT UP)	475 m³ 45°C KEEPING OR 5→45°C HEAT UP IN 96HRS.
ACCOMMODATION HEATING	520	—	520	
ACCOMMODATION USE	100	100	100	
NO.3 FORE WING F.O. TANK (PORS)	—	—	(343)	505 m³ 45°C KEEPING
OTHER & LOSS	135	135	105	
TOTAL	4875	5540	7858	
BLEEDER STEAM FROM T/G	—	360	—	
GRAND TOTAL	4875	5180	7858	
EVAPORATION: AUX. BOILER	—	—	8500	
EVAPORATION: EXH. GAS ECONOMIZER	4875	5180	—	

×1 STEAM CONSUMPTION BASE COMES FROM THE STABILIZED CONDITION OF THE SYSTEM. THE CAPACITY OF EACH HEATER IS DESIGNED BASED ON THE SPECIFICATION AND APPROVED DRAWING.

×2 DESIGN TEMP. IN WINTER AND IN SUMMER

	ATMOSPHERE	ENG. ROOM	SEA WATER
IN WINTER	0°C	25°C	5°C
IN SUMMER	30°C	40°C	30°C

AND ALSO DESIGN BASE OF STEAM REQUIREMENT IS N.S.R FOR MAIN ENG. AND 600 cSt at 50°C FOR F.O. VISCOSITY.

2/8

OPERATION OF CONTROL VALVES FOR T/G HEAT BALANCE DIAGRAM

1. FEED WATER SYSTEM

5FV-3 ; LEVEL CONTROL VALVE OF ATMOS. DRAIN TANK
(TYPE): PNEUMATIC OPERATED 2WAY DIAPHRAGM TYPE
THIS VALVE CONTROL THE LEVEL OF ATMOS. DRAIN TANK AND ALSO AS EMERGENCY FUNCTION IT IS CLOSED IN CASE OF AUX COND. HIGH LEVEL TO PROTECT WATER ENTERING INTO T/G.

5FV-18 ; LEVEL CONTROL VALVE OF AUX CONDENSER
(TYPE): PNEUMATIC OPERATED 2WAY DIAPHRAGM TYPE
THIS VALVE CONTROL THE LEVEL OF AUX. COND.

3FV-9 ; LEVEL CONTROL VALVE OF AUX BOILER DRUM
(TYPE): PNEUMATIC OPERATED 2WAY DIAPHRAGM TYPE
THIS VALVE CONTROL THE LEVEL OF AUX. BOILER DRUM.

3FV-12 ; PRESS. CONTROL VALVE OF FLASHER MAKE UP WATER
(TYPE): PNEUMATIC OPERATED PRIMARY PRESS CONT. 2 WAY DIAPHRAGM TYPE
THIS VALVE CONTROL THE PRIMARY PRESS OF THIS VALVE TO KEEP STABILIZED FEED OF WATER FOR FLASHER AND ALSO AS EMERGENCY FUNCTION IT IS CLOSED IN CASE OF FLASHER EXCESSIVE HIGH LEVEL TO PROTECT WATER ENTERING INTO T/G.

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3FV-27 ; TEMP. CONT. VALVE FOR FEED. PUMP DISCH.
(TYPE) ; PNEUMATIC CONTROL 2 WAY DIAPHRAGM TYPE
THIS VALVE OPERATES TO CONTROL INLET TEMP. OF FEED WATER FOR PRE HEATER AT 100°C.
BESIDES, THIS VALVE IS CLOSED AUTOMATICALLY IN CASE FLASHER FEED WATER INLET VALVE (3FV-12) IS SHUT IN EMERGENCY.

5FV-23 ; CYL. VALVE OF FLASHER SPILL OVER TO DISTIL. W. TANK.
THIS VALVE OPENS AT HIGH LEVEL OF FLASHER AND CLOSES AT NORMAL HIGH LEVEL OF FLASHER.

5FV-8 ; MAKE UP VALVE FOR FEED W. LINE
(TYPE) ; PNEUMATIC CONTROL 2 WAY DIAPHRAGM TYPE
THIS VALVE CONTROL THE FLASHER LEVEL AND ALSO AS EMERGENCY FUNCTION IT IS CLOSED IN CASE OF AUX. COND. HIGH LEVEL TO PROTECT WATER ENTERING INTO T/G.

2. STEAM SUPPLY SYSTEM

1SV-13 ; MISC. HEAT. SYSTEM BACK UP REDUCING VALVE
(TYPE) ; PNEUMATIC CONTROL REDUCING VALVE
THIS VALVE OPERATE TO SUPPLY STEAM FOR MISC. HEAT. SYSTEM KEEPING PRESSURE AT 2.6 K/cm².

1SV-10 ; EXCESS STEAM DUMP VALVE FOR HIGH PRESS. STEAM
(TYPE) ; PNEUMATIC CONTROL 2 WAY DIAPHRAGM TYPE
THIS VALVE OPERATE TO DUMP STEAM TO AUX. COND. WHEN THE HIGH PRESS. STEAM PRESS. INCREASED TO 12 K/cm²

3SV-17 ; EXCESS STEAM DUMP VALVE FOR LOW PRESS. STEAM
(TYPE) ; PNEUMATIC CONTROL 2 WAY DIAPHRAGM TYPE
THIS VALVE OPERATE TO DUMP STEAM TO AUX. COND. WHEN THE LOW PRESS. STEAM PRESS. INCREASED TO 1.5 K/cm²

3SV-6 ; MOTOR VALVE FOR LOW PRESS STEAM LINE
(TYPE) MOTOR VALVE
THIS VALVE OPERATES TO CONTROL LOW PRESS. STEAM FLOW TO T/G.

3SV-96 ; CYLINDER VALVE FOR T/G LOW PRESS STEAM LINE
(TYPE) CYLINDER VALVE
THIS VALVE OPERATES TO BE CLOSED IN CASE OF EXCESSIVE HIGH LEVEL OF FLASHER AND OPENED WHEN THE LEVEL OF FLASHER DECREASED TO NORMAL HIGH LEVEL

3SV-13 ; MOTOR VALVE FOR BLEEDER LINE FROM T/G
(TYPE) MOTOR VALVE
THIS VALVE OPERATES TO CONTROL BLEEDER STEAM FROM T/G.

3SV-97 ; CYLINDER VALVE FOR BLEEDER LINE FROM T/G
(TYPE) CYLINDER VALVE
THIS VALVE OPERATES TO BE OPENED IN CASE BLEEDING OF STEAM FROM T/G IS POSSIBLE BY DETECTING OF GOVERNOR VALVE LIFT.

NOTE ;

IF T/G IS NOT USED (FOR EXAMPLE IN PORT CONDITION), FOLLOWING OPERATION SHALL BE DONE FROM THE VIEW POINT OF ENERGY SAVE.

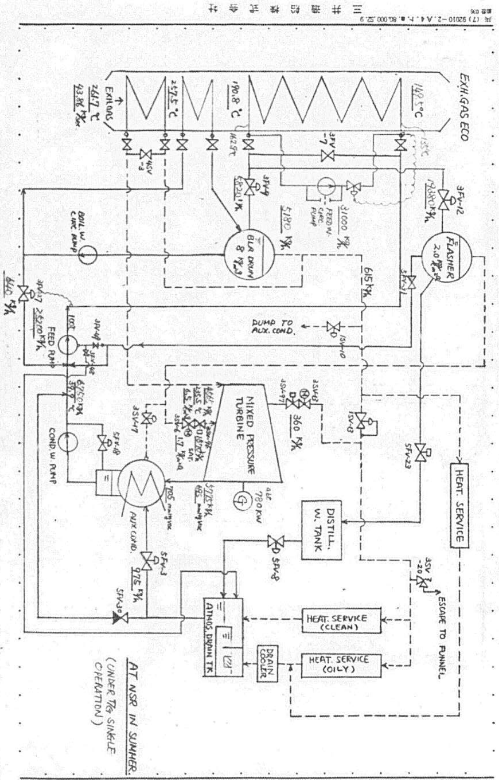
a) MINIMUM FLOW BY-PASS LINE FROM FEED PUMP SHALL BE CHANGED BY OPENING THE VALVE 3FV-48 AND CLOSING 3FV-49. (UNDER THE USAGE OF T/G, 3FV-48 SHALL BE KEPT CLOSE AND 3FV-49 SHALL BE OPENED FROM THE VIEW POINT OF ENERGY SAVE.)

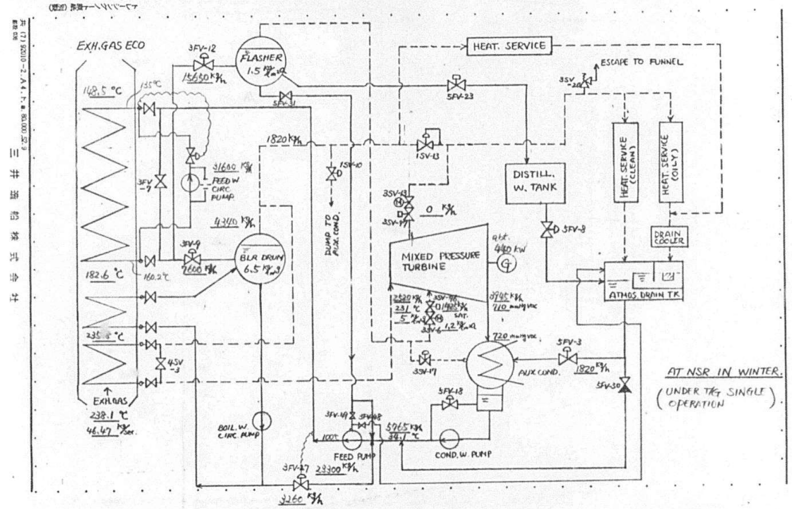
NOTE; AS A EMERGENCY CASE UNDER M/E STOP CONDITION, BY-PASS LINE OF AUX. COND. AND COND. W. PUMP SHALL BE USED BY THE FOLLOWING OPERATION.
BUT IN THIS CASE, LEVEL OF ATMOS. DRAIN TANK SHALL BE CONTROLLED MANUAL-LY.
i) OPEN THE VALVE 5FV-30
ii) CUT-OFF THE FEED LINE FROM ATMOS. DRAIN TANK TO AUX. COND.
iii) STOP THE AUX. COND. CIRC. PUMP
iv) CUT-OFF THE MAKE UP LINE TO FLASHER
v) STOP COND. W. PUMP AND CLOSE FLASHER DRAIN VALVE 5FV-31

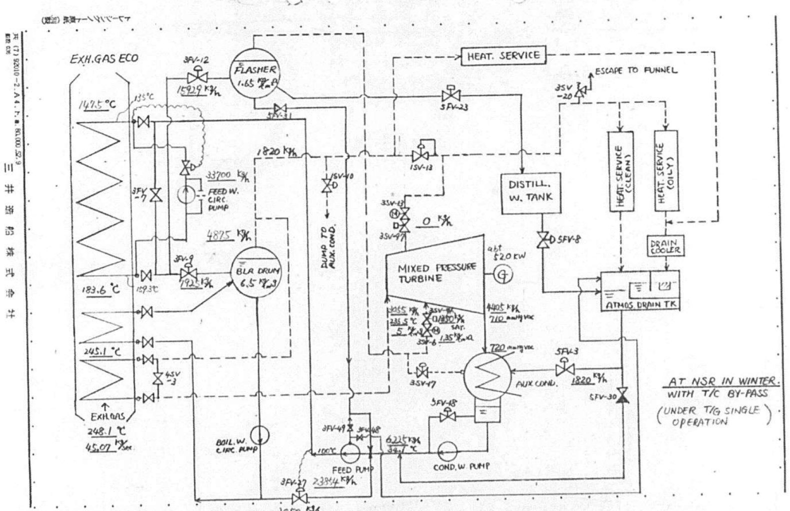
b) AUX. CONDENSER AND COND PUMP SHALL BE USED.
AUX COND. COOL. S.W PUMP CAN'T BE STOPPED IF M/E IS STOPPED BECAUSE AUX. COND. SHALL BE USED AS DUMP COND. UNDER M/E OPERATION EVEN IF T/G IS NOT USED.

c) BY-PASS LINE OF PRE-HEATER AND SUPER HEATER SHALL BE USED, AND ALSO BOIL. W. CIRC. PUMP SHALL BE STOPPED IF THE MAIN ENGINE IS STOPPED. (NOTE: BOILER W. CIRC. PUMP SHALL BE STOPPED ONLY AFTER CONFIRMING THE COOLING DOWN OF EVAPORATOR TUBE.)

d) BY-PASS LINE OF PRE-HEATER AND SUPER HEATER SHALL BE USED IN CASE T/G IS USED ONLY BY USING AUX. BOILER.




三井造船株式会社
EXH.GAS ECO
FLASHER
HEAT. SERVICE
ESCAPE TO FUNNEL
DISTILL. W. TANK
HEAT SERVICE (CLEAN)
HEAT SERVICE (OILY)
DRAIN COOLER
MIXED PRESSURE TURBINE
ATMOS DRAIN TK
BLR DRUM
DUMP TO AUX. COND.
AUX COND.
BOIL. W CIRC. PUMP
FEED PUMP
COND. W. PUMP
EXH.GAS
238.1 °C
AT NSR IN WINTER.
(UNDER T/G SINGLE OPERATION)


三井造船株式会社
EXH.GAS ECO
FLASHER
HEAT. SERVICE
ESCAPE TO FUNNEL
DISTILL. W. TANK
HEAT SERVICE (CLEAN)
HEAT SERVICE (OILY)
DRAIN COOLER
MIXED PRESSURE TURBINE
ATMOS DRAIN TK
BLR DRUM
DUMP TO AUX. COND.
AUX COND.
BOIL. W CIRC. PUMP
FEED PUMP
COND. W. PUMP
EXH.GAS
248.1 °C
AT NSR IN WINTER.
WITH T/C BY-PASS
(UNDER T/G SINGLE OPERATION)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, APPLICABLE TO S.NO.1324 AND S.NO.1325	JUN 25 '86

DWG. NO. 5110005

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

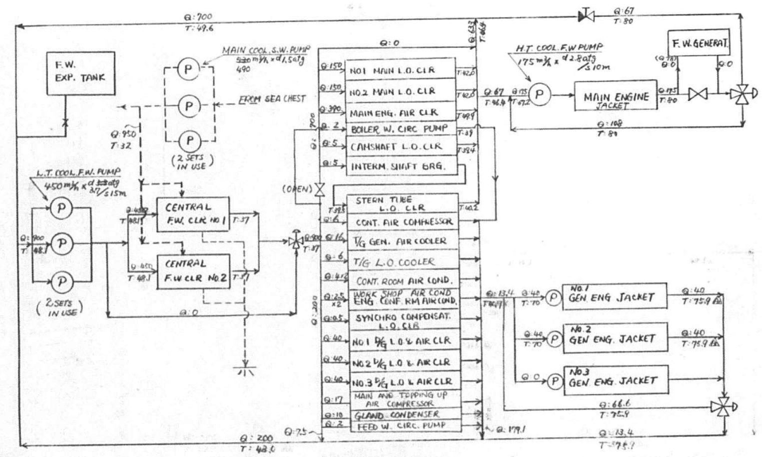
MITSUI ENGINEERING & SHIPBUILDING CO., LTD. TAMANO WORKS

SHIP'S NAME: TILLIE LYKES

冷却水系統ヒートバランス及び冷水の配分
HEAT BALANCE & FLOW DIAGRAM FOR COOL. WATER SYSTEM

LYKES REF. NO. 410502 — MITSUI DRAWING NO. 5110005

(2 SHEETS WITH COVER)



HEAT BALLANCE DIAGRAM (F.W. SYSTEM)

(CASE 1)

EQUIPMENT	HEAT TRANSFER (Kcal/h)
NO.1 CENTRAL F.W. COOLER	5015×10^3
NO.2 CENTRAL F.W. COOLER	5015×10^3
MAIN ENGINE JACKET	$2,240 \times 10^3$
NO.1 MAIN L.O. COOLER	755×10^3
NO.2 MAIN L.O. COOLER	755×10^3
MAIN ENGINE AIR COOLER	$5,050 \times 10^3$
CAMSHAFT L.O. COOLER	12×10^3
INTERMEDIATE SHAFT BEARING	12.5×10^3
STERN TUBE L.O. COOLER	3.3×10^3
NO.1 GEN. ENGINE JACKET	237×10^3
NO.2 GEN. ENGINE JACKET	237×10^3
NO.3 GEN. ENGINE JACKET	0
NO.1 GEN. ENG. L.O. & AIR CLR	185×10^3
NO.2 GEN. ENG. L.O. & AIR CLR	185×10^3
NO.3 GEN. ENG. L.O. & AIR CLR	0
T/G GENERATOR AIR COOLER	41×10^3
MAIN & TOPPING UP AIR COMP.	170×10^3
CONTROL AIR COMPRESSOR	30.2×10^3
AIR COND. (C/R, WORK SHOP, ENG. CONF. RM)	58.8×10^3
SYNCHRO COMPENSATOR L.O. COOLER	2×10^3
T/G L.O. COOLER	36.45×10^3
GLAND CONDENSER	19.2×10^3

OPERATING CONDITION OF MACHINERY

MACHINERY	NO. OF SET USED	CONDITION
MAIN ENGINE	1	MCO
GEN. ENGINE	2	85%
TURBO GENERATOR	1	
MAIN AIR COMPRESSOR	3	
TOPPING UP AIR COMPRESSOR	1	
CONTROL AIR COMPRESSOR	1	
F. W. GENERATOR	0	
HIGH TEMP. COOL. F.W. PUMP	1	
LOW TEMP. COOL. F.W. PUMP	2	
MAIN COOL. S.W. PUMP	2	

(CASE 1)

CONDITION OF SHIP

NAVIGATION
(DESIGN CONDITION)

三井造船株式会社

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EQUIPMENT	HEAT TRANSFER (Kcal/h)
NO.1 CENTRAL F.W. COOLER	1624 x 10³
NO.2 CENTRAL F.W. COOLER	0
MAIN ENGINE JACKET	0
NO.1 MAIN L.O. COOLER	0
NO.2 MAIN L.O. COOLER	0
MAIN ENGINE AIR COOLER	0
CAMSHAFT L.O. COOLER	0
INTERMEDIATE SHAFT BEARING	0
STERN TUBE L.O. COOLER	0
NO.1 GEN. ENGINE JACKET	237 x 10³
NO.2 GEN. ENGINE JACKET	237 x 10³
NO.3 GEN. ENGINE JACKET	237 x 10³
NO.1 GEN. ENG. L.O. & AIR CLR	185 x 10³
NO.2 GEN. ENG. L.O. & AIR CLR	185 x 10³
NO.3 GEN. ENG. L.O. & AIR CLR	185 x 10³
T/G GENERATOR AIR COOLER	41 x 10³
MAIN & TOPPING UP AIR COMP.	170 x 10³
CONTROL AIR COMPRESSOR	30.2 x 10³
AIR COND. (C/R, WORK SHOP, ENG CONF. RM)	58.8 x 10³
SYNCHRO COMPENSATOR L.O. COOLER	2 x 10³
T/G L.O. COOLER	36.45 ~~22~~ x 10³
GLAND CONDENSER	19.2 x 10³.

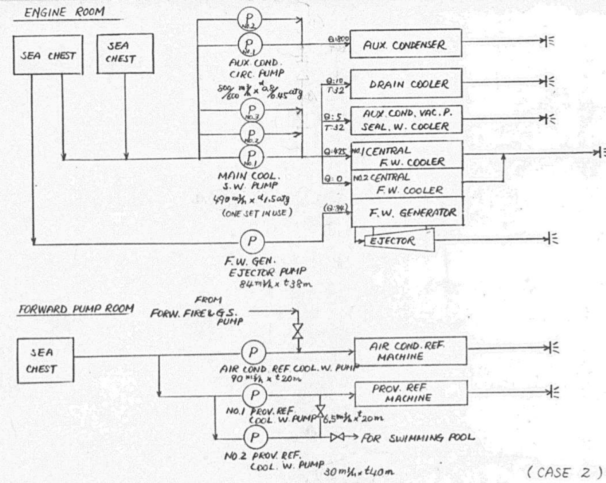
OPERATING CONDITION OF MACHINERY

MACHINERY	NO. OF SET USED	CONDITION
MAIN ENGINE	0	
GEN. ENGINE	3	85%
TURBO GENERATOR	1	
MAIN AIR COMPRESSOR	3	
TOPPING UP AIR COMPRESSOR	1	
CONTROL AIR COMPRESSOR	1	
F. W. GENERATOR	0	
HIGH TEMP. COOL. F.W. PUMP	0	
LOW TEMP COOL. F.W. PUMP	1	
MAIN COOL. S.W. PUMP	1	

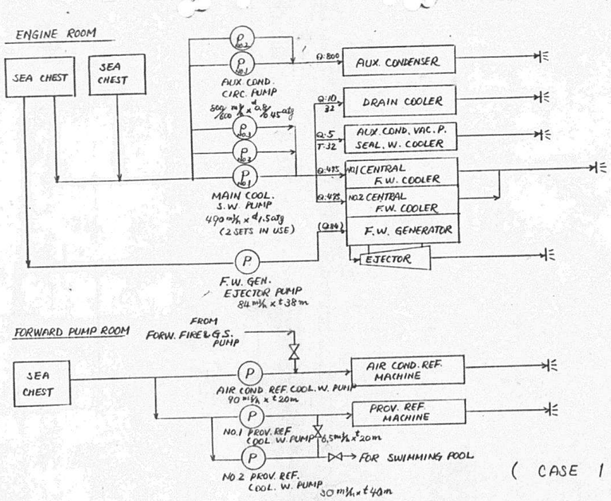
(CASE 2)

CONDITION OF SHIP

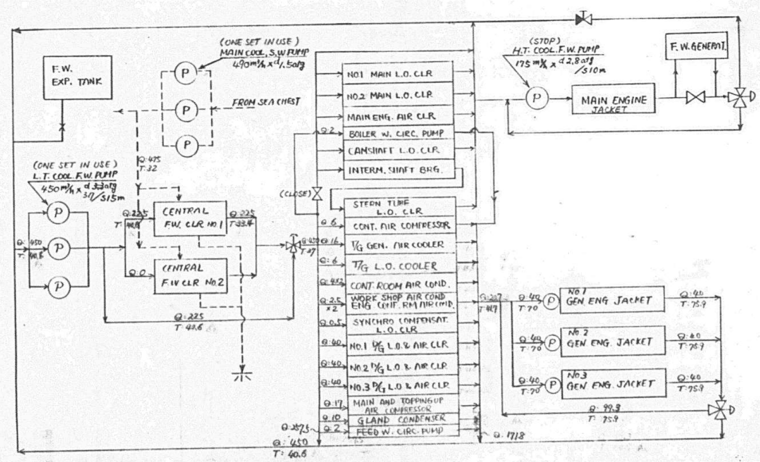
CARGO HANDLING WITH REF CONT.



(CASE 2)



(CASE 1)



HEAT BALLANCE DIAGRAM
(F.W. SYSTEM)

(CASE 2)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		WAS PREPARED FOR S.NO 1323 AS "FINISHED PLAN" APPLICABLE TO S.NO 1324 AND S.NO 1325	NOV. 8 '86

DWG. NO. 5110006

2-4

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL								
A	—	—						
B	—	—						
C	JAN.23.'86	OFTS/MES-1176						
D	FEB.13.'86	OFTS/MES-1210						
E	MAR.11.'86	OFTS/MES-1242						
F	MAY.12.'86	OFTS/MES-1276						
G	JUN.9.'86	OFTS/MES-1279						

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP'S NAME: TILLIE LYKES

運転用 潤滑油表
RECOMMENDABLE L.O. CHART FOR TRIAL

SHIP DESIGN DEPARTMENT
OUTFITTING DESIGN SECTION
NOV. 1985

LYKES REF. NO. 410503
MITSUI DRAWING NO. 5110006
JOB NO. TS1323/24/25
(TEL.2735)
SHEETS WITH COVER

LUBRICANT LIST

MACHINERY x No. of SET (MANUFACTURER and TYPE)	LUBRICATING POINT	LUBRICANT (BRAND: SHELL)	INITIAL CHARGE (litter)
DIESEL GENERATOR ENGINE x 3	Turbocharger (IHI BBC, VTR 201)	Tellus oil 68	0.8 x 3
	Governor (Woodward, UG-8D)	Tellus oil 68	1.5 x 3
	Grease point	Alvania EP grease 2	a little
GENERATOR TURBINEx 1 (Mitsubishi, AT-34F)	Bearing	Turbo oil T32	400
	Governor	Turbo oil T32	1.5
	Gear coupling	Omala oil 680	1
SHAFT GENERATOR x 1 (Siemens)	Generator non-drive end brg.	Turbo oil T46	80
	Synchro compensator brg.	Turbo oil T46	67
EMERGENCY GENERATOR ENGINE (G.M., 8V-71T) x 1	Crank case	Myrina oil 15W/40 (or Rotella Oil T 15W/40)	22
MAIN AIR COMPRESSOR x 3 (Tanabe, HC277A-YS)	Crank case	Corena N 100 (or H 100)	20 x 3
	Oil box	Corena N 100 (or H 100)	1.8 x 3
TOPPING UP AIR COMPRESSOR x 1 (Tanabe, HC264A-YS)	Crank case	Corena N 100 (or H 100)	17 x 1
	Oil box	Corena N 100 (or H 100)	0.6 x 1
SHIP SERV. AIR COMPRESSOR x 1 (Tanabe, VLH 114)	Crank case	Corena N 100 (or H 100)	26 x 1

CHAPTER 2 LUBRICATING OIL CHART

LUBRICANT LIST

MACHINERY x No. of SET (MANUFACTURER and TYPE)	LUBRICATING POINT	LUBRICANT (BRAND: SHELL)	INITIAL CHARGE (litter)
MAIN ENGINE x 1 (Mitsui B & W 9L80MCE)	Cylinder	Alexia oil 50	3500
	Main bearing and Piston cooling	Melina oil 30	41400
	Camshaft bearing and Exhaust valve drive	Melina oil 30	1590
	Turbocharger (Mitsui-MAN NA-70)	Melina oil 30	200
	Governor (Woodward)	Tellus oil 68	6
	Turning gear — Enclosed	Omala oil 150	25
	Turning gear — Open	Cardium compound D	a little
	Grease point	Alvania EP grease 2	a little
STERN TUBE x 1	Stern tube brg.	Melina oil 30	4600
INTERMEDIATE SHAFT BRG X 3	Int. shaft brg.	Melina oil 30	22 X 3
DIESEL GENERATOR ENGINE x 3 (Daihatsu, 6DL-24)	Bearing and Cylinder.	Argina T oil 30	1310 x 3
	Rocker arm	Argina T oil 30	10 x 3

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LUBRICANT LIST

MACHINERY x No. of SET (MANUFACTURER and TYPE)	LUBRICATING POINT	LUBRICANT (BRAND: SHELL)	INITIAL CHARGE (litter)
CONTROL AIR COMPRESSOR x 1 (NASH, 1251C)	Grease	Alvania EP Grease 2	0.2 Kg
EMERG. AIR COMPRESSOR x 1 (COMP. : Tanabe LSHC-20B) (ENG. : Yanmar NS-40)	Crank case (comp.)	Corena N 100 (or H100)	0.7 x 1
	Crank case (Eng.)	Melina oil 30	1.7 x 1
H.F.O. PURIFIER x 2 (Nagase-Alfa, FOPX 613)	Gear case	Omala oil 220	12 x 2
L.O. PURIFIER x 2 (Nagase-Alfa, MOPX 310)	Gear case	Omala oil 220	12 x 2
DIESEL OIL PURIFIER x 1 (Nagase-Alfa, MOPX 207)	Gear case	Omala oil 220	8
AUX. L.O. PURIFIER x 1 (Nagase-Alfa, MAPX 204)	Gear case	Omala oil 220	3
HEELING PUMP x 1 (FRAMO, RBP2-300)	Mechanical seal (Prop. shaft)	Turbo oil T32	10
	Gear house wheel & roller brg.	Tellus oil 68	10
BILGE PUMP x 2 (Heishin pump works, PVN-5)	Crank case	Melina oil 30	1 x 2

LUBRICANT LIST

MACHINERY x No. of SET (MANUFACTURER and TYPE)	LUBRICATING POINT	LUBRICANT (BRAND: SHELL)	INITIAL CHARGE (litter)
HOISTING CRANE x 1 (Sekigahara, 7 Ton)	Enclosed gear	Omala oil 220	3.6
	Open gear and Wire rope	Cardium compound D	0.2 kg
	Grease point	Alvania EP grease 2	12 kg
UNIVERSAL MACHINE x 1 (Dainichi, DUM-2GA-2)	Bearing & Bed way	Turbo oil T32	10
	Grease point	Alvania EP grease 2	a little
MAIN ENGINE EXHAUST VALVE GRINDING MACHINE x 1 (Nagao machinery, NGM-80B)	Oiler	Tellus oil 68	a little
	Oil poit	Tellus oil 68	a little
WINDLASS x 2 (Fukushima, K76811II-W320)	Enclosed	Omala oil 150	10 kg x 2
	Open gear	Cardium compound D	10 kg x 2
	Grease point	Alvania EP grease 2	3 kg x 2
MOORING WINCH x 4 (Fukushima, W320-L/NH x 2, W320-R/NV x 2)	Enclosed gear	Omala oil 150	10 kg x 4
	Grease point	Alvania EP grease 2	3 kg x 4

LUBRICANT LIST

MACHINERY x No. of SET (MANUFACTURER and TYPE)	LUBRICATING POINT	LUBRICANT (BRAND: SHELL)	INITIAL CHARGE (litter)
HYDRAULIC POWER UNIT FOR WINDLASS and MOORING WINCH x 6 (Fukushima)	Hydraulic system (Fore)	Tellus oil T100	1900
	Hydraulic system (Aft)	Tellus oil T100	2400
	Reduction gear (Fore)	Omala oil 220	10.5
	Reduction gear (Aft)	Omala oil 220	10.5
	Grease point	Alvania EP grease 2	a little
MOORING FITTING (Mitsui)	Grease point	Alvania EP grease 2	13 kg
HATCH COVER x 24 (Mitsubishi)	Grease point	Alvania EP grease 2	3 kg x 24
MOORING WIRE ROPE x 6 (Mitsui)	Rust Prevention	Cardium compound D	20 kg x 6
STEERING GEAR x 1 (Mitsubishi)	Hydraulic oil	Tellus oil 68	4063
RUDDER CARRIER x 1 (Mitsui)	Thrust bearing	Tellus oil 68	40
	Radial bearing	Alvania EP grease 2	15 kg
BOW THRUSTER x 1 (Mitsubishi)	Hydraulic oil	Tellus oil 68	886
	Grease point	Alvania EP grease 2	a little

LUBRICANT LIST

MACHINERY x No. of SET (MANUFACTURER and TYPE)	LUBRICATING POINT	LUBRICANT (BRAND: SHELL)	INITIAL CHARGE (litter)
VALVE REMO-CONT. SYS. (DANFOSS)	Hydraulic oil	EP hydra hinge oil 32	575
W/T SLIDING DOOR x 1 (WALZ & KRENZER, INC.)	Hydraulic system	Tellus oil 46	21
	Grease point	Alvania EP grease 2	0.2 kg
FORE SIDE SIDE PORT DOOR x 1 (NAKA IRON WORKS CO, LTD.)	Hydraulic oil	Tellus oil 68	165
	Grease point	Alvania EP grease 2	0.3 kg
ACCOMM. LADDER WINCH x 2 (NAKANO SEISAKU-SHO)	Upper gear	Omala oil 460	10
	Lower gear	Omala oil 150	12
	Grease point	Alvania EP grease 2	a little
	Wire rope	Alvania EP grease 2	8 kg
PILOT HOIST LADDER WINCH x 2 (CHUO KOGYO)	Worm gear case	Omala oil 150	4
	Spur Gear case	Tellus oil T100	1
	Chain case	Tellus oil T100	8
	Grease point	Alvania EP grease 2	a little
	Open gear	Cardium compound D	a little

LUBRICANT LIST

MACHINERY x No. of SET (MANUFACTURER and TYPE)	LUBRICATING POINT	LUBRICANT (BRAND: SHELL)	INITIAL CHARGE (litter)
EXH. GAS ECONOMIZER SOOT BLOWER (GADELIUS, G9B) x 10	Gear case motor reducer	Omala oil 100	0.2 x 10
	Grease	Alvania EP grease 2	a little
MOTOR VALVE FOR FORWARD PART GARBAGE CHOOT x 3 (OSAKA VALVE)	Gear case	Alvania EP grease RO (or Alvania EP grease 1)	4.5 kg x 3
SEWAGE TREATMENT UNIT (OMNIPORE : 12MX)	Macerator pump	Turbo oil T32	a little
BOAT DAVIT x 2 (SCHAT DAVIT LTD)	Enclosed gears	Omala oil 100	15 x 2
	Stieber roller clutches	Tellus oil C10	a little
	Sprag clutches	Alvania grease 3 (or R3)	a little
	Wire rope	Cardium Compound D	a little
	Grease point	Alvania grease 3 (or R3)	a little

LUBRICANT LIST

MACHINERY x No. of SET (MANUFACTURER and TYPE)	LUBRICATING POINT	LUBRICANT (BRAND: SHELL)	INITIAL CHARGE (litter)
BOATSWAIN'S STORE CRANE x 1 (SCHAT DAVIT LTD.)	Winch Gearboxes	Melina oil 30	19.5
	Grease point	Alvania grease 3 (or R3)	a little
	Wire Rope	Cardium compound D	10 kg
ENGINE ROOM CRANE x 1 (SCHAT DAVIT LTD.)	Winch Gearboxes	Melina oil 30	32
	Grease point	Alvania grease 3 (R3)	a little
	Wire Rope	Cardium compound D	10 kg
LIFE BOAT ENGINE x 1 (SAAB)	Engine crank case	Myrina oil 15W/40 (or Rotella oil T15W/40)	3
	Oil point	Myrina oil 15W/40 (or Rotella oil T15W/40)	a little
AIR COND. REF. PLANT x 2 (TAKATORI)	Freon compressor	Clavus oil 46 (or G46)	19.4 x 2
RPOV. REF. PLANT x 2 (TAKATORI)	Freon compressor	Clavus oil 46 (or G46)	2.4 x 2
ELEVATOR x 2 (NIHON ELEVATOR)	Enclosed Gear	Omala oil 220	7.5 x 2
	Bearing	Alvania EP grease 2	a little
	Guide rail	Tellus oil 68	2 x 2
DUMBWAITER x 1 (NIHON ELEVATOR)	Enclosed Gear	Omala oil 220	4
	Guide rail	Tellus oil 68	a little

APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	20/Mar/85	OFTS/MES/204			25/Mar/85	T-8-2		

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC.CHIEF
ASSIST.CHIEF
CHARGE ENG'R
STAFF

軸系装置
ARRANGEMENT OF SHAFTING

DATE (TEL 2235)

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25	1/100	430101	5124200
JOBCLASSIF.NO. E04-01 02			

(5 SHEETS WITH COVER)

PLAN RECORD			
ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	July/7/86 J. M

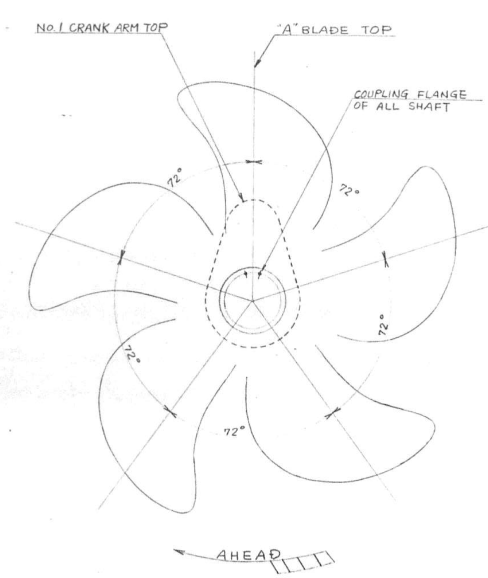
DWG.NO. 5124200 (1)

PARTICULARS		
MAIN ENGINE	TYPE	TWO STROKE CYCLE, SINGLE ACTING, SOLID INJECTION, CROSHEAD, DIRECT REVERSIBLE, TURBOCHARGED MARINE DIESEL ENGINE MITSUI B&W 9L80MCE
	NO OF CYL.	9
	DIA.OF CYL.	800 MM
	MAX.OUTPUT	28800 PS
	MAX.REV.	83 R.P.M.
INTERMEDIATE SHAFT	WEIGHT	No.1 23T600KG, No.2 36T500KG
INTERMEDIATE SHAFT BEARING	TYPE	SELF OIL LUBRICATED BEARING LINED WITH WHITE METAL
	WEIGHT	2T100 KG
PROPELLER SHAFT	WEIGHT	49T440 KG
STERN TUBE BEARING	TYPE	OIL LUBRICATED BEARING LINED WITH WHITE METAL
	LENGTH	F.W.D. 500 MM / A.F.T. 1590 MM
STERN TUBE SEALING	TYPE	SIMPLEX COMPACT
	SIZE	#850
PROPELLER	TYPE	SOLID (NONUNIFORM PITCH)
	DIA.	8100 MM
	NO OF BLADE	5
	TURNING DIRECTION	RIGHT HANDED (LOOKING FORE)
	POLAR MASS MORMENT OF INERTIA	120230 kg-m² (1226800 KG-CM-SEC²) (IN AIR)
	WEIGHT	41T750 KG
SHAFT RAKE	VERTICAL	-
	HORIZONTAL	-
	LINE RATIO	-

※ MARKED DIMENSIONS ARE SHOWN FOR REFERENCE

TS1323/4/5 5124200 (1/3)

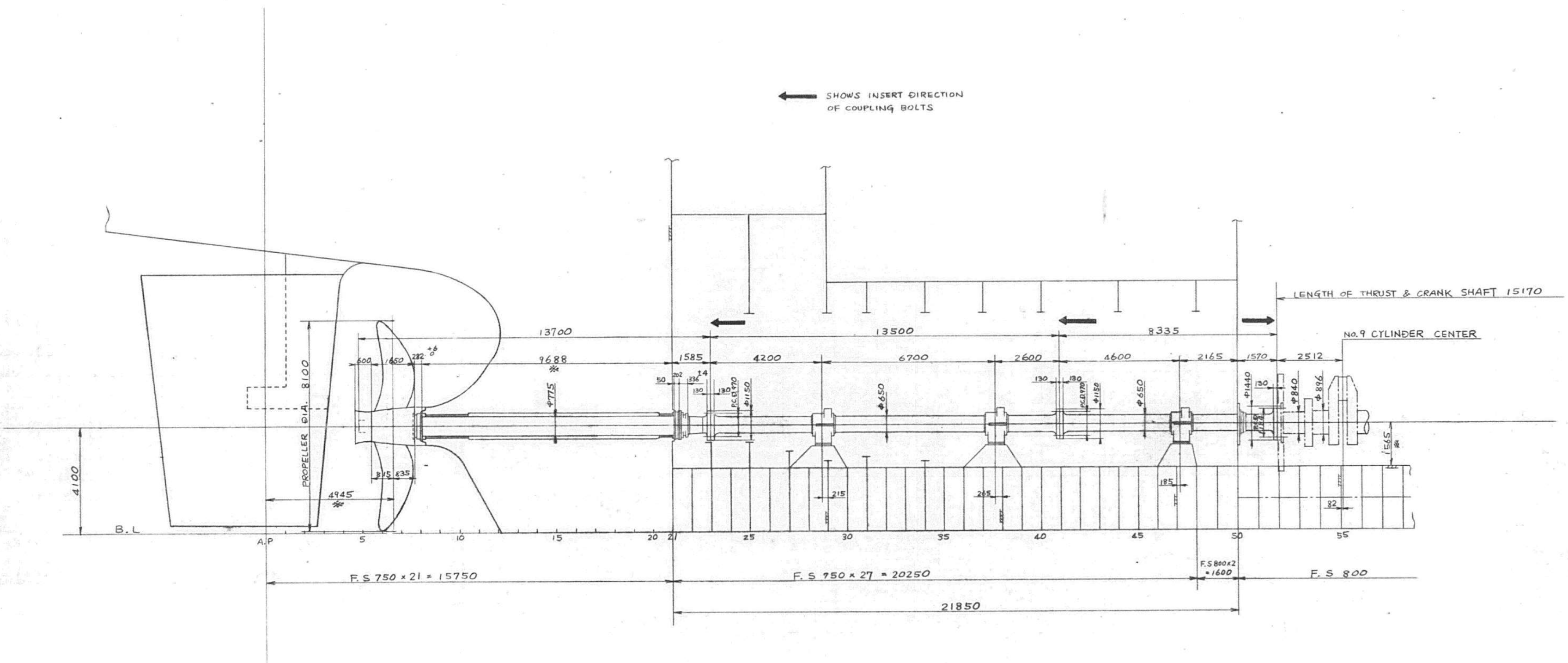
FR.4 LOOKING FORE



RELATIVE ANGULAR POSITION

TS1323/4/5 5124200 (2/3)

1414



TS1323/4/5 5124200 (3/3)

1-12(1×5)

1415

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
APPROVAL OF OWNER & REGULATORY BODIES								
ORIGINAL	20/MAR/85	OFTS/MES/203			26/MAR/85	T-8-2		
A	17/APR/85	OFTS/MES/297			26/APR/85	T-8-2		

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
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NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO. 1325 SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC. CHIEF
ASST. CHIEF
CHARGE ENG'R
SHIP DESIGN DEPARTMENT

中間軸
INTERMEDIATE SHAFT

DATE (TEL 2235)

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25		430102	5124201
JOBCLASSIF. NO. E-04-01			

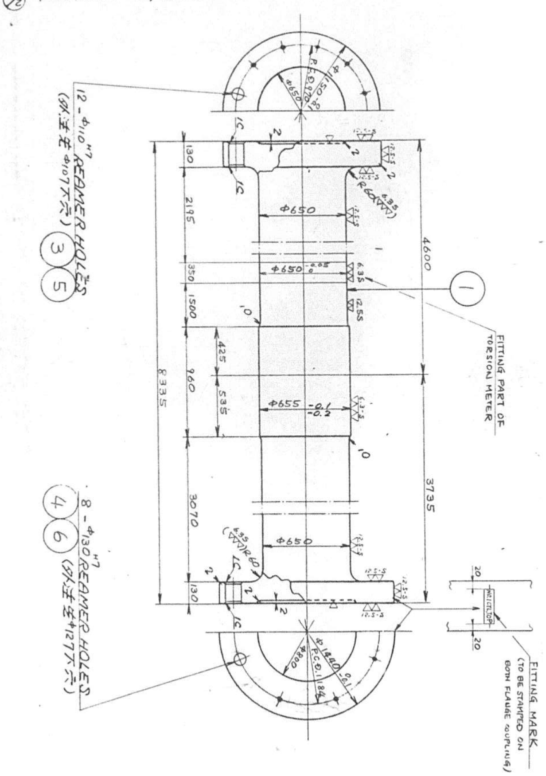
(6 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	July/17/86 J.M

DWG. NO. 5124201 (1)

TS1323/4/5 5124201 (2/4)



PHYSICAL PROPERTIES OF MATERIALS			
SIGNATURE OF MATERIAL IN ORDER LIST			
CLASSIFCATION SOCIETY	ABS	ABS	ABS
CORRESPONDING SIGNATURE OF MATERIAL STIPULATED ON RULES	GRADE 2	GRADE 3	GRADE 4
TENSILE STRENGTH (kg/mm²)	> 42	> 53	> 58.5
YIELD POINT (kg/mm²)	> 21	> 26.5	> 30.5
ELONGATION (LONGI.) (TRANS.) (%)	> 24 > 20	> 19 > 17	> 20 > 17
REDUCTION OF AREA (LONGI.) (TRANS.) (%)	> 36 > 29	> 30 > 28	> 35 > 27
		—	—

SYMBOLS	EXPLANATION OF SYMBOL
◎	TAKE TEST PIECES FROM EACH PRODUCT OF CASTING OR FORGING
○	TAKE TEST PIECES FROM EACH CHARGE OF CASTING OR FORGING
X	USE TESTED MATERIAL ONLY

SYMBOLS	EXPLANATION OF SYMBOL
~	HAND FINISH
▽	ROUGH FINISH
▽▽	SEMI FINE FINISH
▽▽▽	FINE FINISH
▽▽▽▽	SUPER FINE FINISH

備考 REMARKS

図面関係 DWG. FOR REFERENCE
1. 軸系装置 (5124200) ARRANGEMENT OF SHAFTING
2. 推進軸 (5124203) PROPELLER SHAFT.
3. 推力軸 THRUST SHAFT

検査関係 INSPECTION
1. 船級 : ABS CLASSIFICATION : ABS
2. 全ての試験検査はABS規則に従って行うこと。 ALL TEST & INSPECTION TO BE DONE IN ACCORDANCE WITH ABS RULE.

外注関係
1. 平行リーマー穴は径で 3 MMの仕上げ代残しとすること。
2. ( )内寸法は外注先の仕上がり寸法を参考に示す。

工作関係 WORKMAN-SHIP
1. 符号①②は外注品使用。但しリーマー穴は仕上げ代を残して納入されるので当所において仕上がり完成のこと。
REAMER HOLES OF № ①② TO BE FINISH MACHINED IN TAMANO WORKS
2. 常備及予備ボルト共に加工用センター穴を残すこと NOT TO CUT OFF THE CENTER HOLES OF EACH WORKING & SPARE BOLT FOR RE-MACHINING.
3. 予備ボルトは径で 3 MMの仕上げ代を残すこと。 FINISH MARGIN FOR SPARE BOLT TO BE 3 MM ON DIAMETER

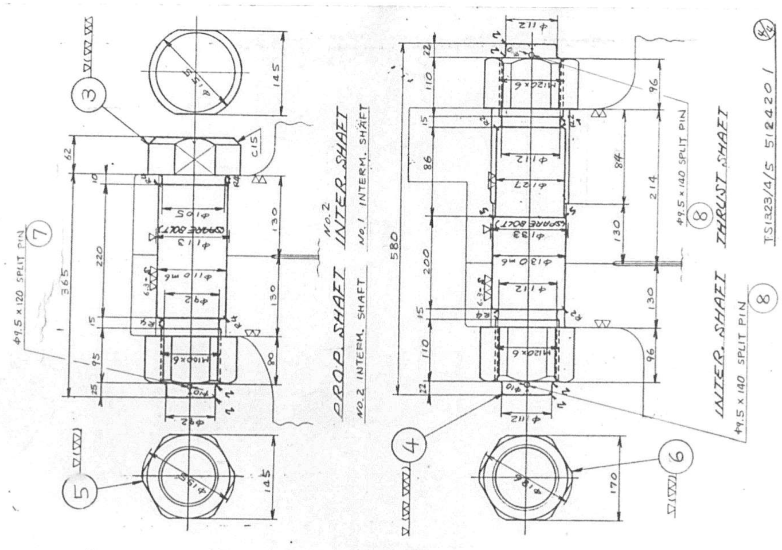
符号 NO.	名称 NAME	材料 MATERIAL	試験片 TEST PIECE	常備 USE	予備 SPARE	合計 TOTAL	関係工場 WORK SHOP	1個 ONE	合計 TOTAL	記事 REMARKS
8	SPLIT PIN	STEEL WIRE		16	16	32				5224208
7	SPLIT PIN	STEEL WIRE		24	12	36				〃
6	NUT	FORGED STEEL SF45A		16	16	32		9.31	298	〃
5	NUT	FORGED STEEL SF45A		24	12	36		6.85	247	〃
4	REAMER BOLT	FORGED STEEL ABS GRADE 4	○	8	8	16		53.6	858	〃
3	REAMER BOLT	FORGED STEEL ABS GRADE 3	○	24	12	36		32.8	1T180	5224208
2	No.2 INTERM. SHAFT	FORGED STEEL ABS GRADE 2	◎	1		1		36T500	36T500	5224201 外注品使用
1	No.1 INTERM. SHAFT	FORGED STEEL ABS GRADE 2	◎	1		1	ま.く㊀	23T600	23T600	5224201 外注品使用

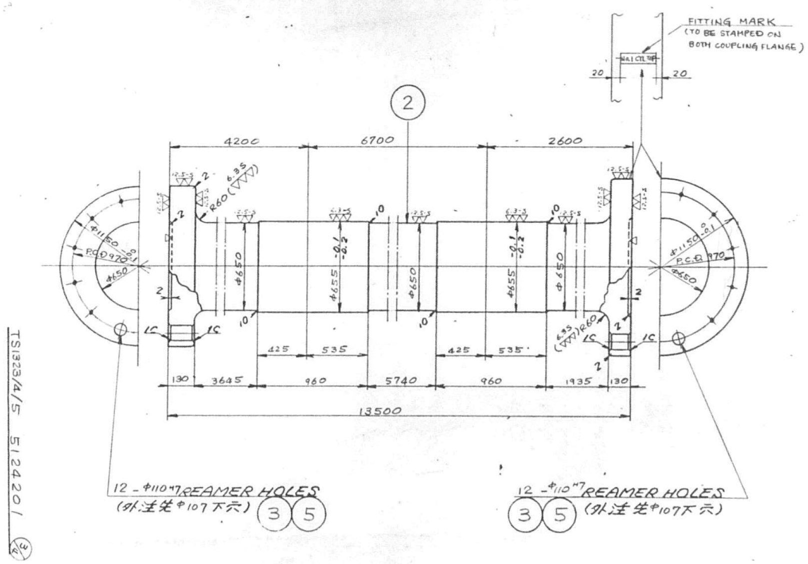
(Quantity: 製造個数 — USE / SPARE / TOTAL; Weight (KG): 重量 — ONE / TOTAL)

製造個数は1隻分を示す QUANTITY PER SHIP IS GIVEN IN THIS TABLE. 3隻分製造のこと MAKE FOR 3 SHIPS

TS1323/4/5 5124201 (1/4)

1416


PROP. SHAFT
No.2 INTER. SHAFT
No.1 INTERM. SHAFT
No.2 INTERM. SHAFT
INTER. SHAFT
THRUST SHAFT
φ9.5 x 120 SPLIT PIN
φ9.5 x 140 SPLIT PIN
SPARE BOLT
TS1323/4/5 512420 1


FITTING MARK
(TO BE STAMPED ON BOTH COUPLING FLANGE)
12 - φ110H7 REAMER HOLES
(外注先φ107下穴)
12 - φ110H7 REAMER HOLES
(外注先φ107下穴)
TS1323/4/5 512420 1

1417

APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	20th/MAR/85	OFTS/MES/205			26th/MAR/85	T-8-2		
A	17th/APR/85	OFTS/MES/298			25th/APR/85	T-8-2		
B	13th/SEP/85	OFTS/MES/931			3rd/SEP/85	T-8-2		

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO. 1325
SHIP'S NAME TILLIE LYKES
OUTFITTING DESIGN SECTION
SEC.CHIEF
ASSIST.
CHARGE ENG'R.
DATE

推進軸
PROPELLER SHAFT

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25		430103	5124203
JOBCLASSIF. NO. E-04-01			

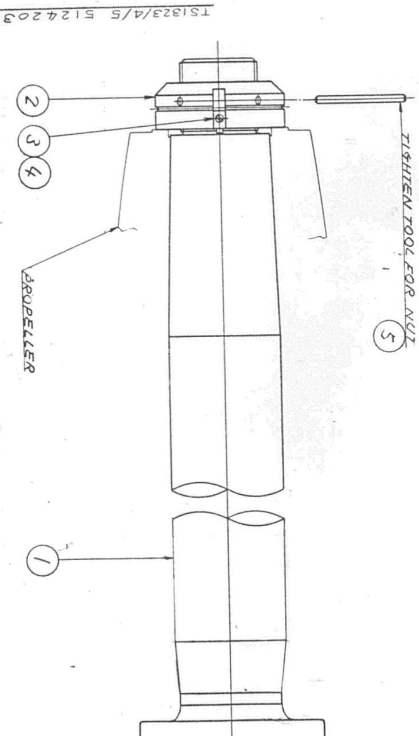
(6 SHEETS WITH COVER)

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	July/17/86 ∂.M

DWG.NO. 5124203 (i)

TS1323/4/5 5124203



PHYSICAL PROPERTIES OF MATERIALS		
SIGNATURE OF MATERIAL IN ORDER LIST		
CLASSIFCATION SOCIETY	ABS	
CORRESPONDING SIGNATURE OF MATERIAL STIPULATED ON RULES	GRADE 2	
TENSILE STRENGTH (KG/MM²)	>42	
YIELD POINT (KG/MM²)	>21	
ELONGATION (LONGI.)(TRANS.) (%)	>24 >20	
REDUCTION AREA (LONGI.)(TRANS.) (%)	>36 >29	

SYMBOLS	EXPLANATION OF SYMBOL
◎	TAKE TEST PIECES FROM EACH PRODUCT OF CASTING OR FORGING
○	TAKE TEST PIECES FROM EACH CHARGE OF CASTING OR FORGING
X	USE TESTED MATERIAL ONLY

SYMBOLS	EXPLANATION OF SYMBOL
∼	HAND FINISH
▽	ROUGH FINISH
▽▽	SEMI FINE FINISH
▽▽▽	FINE FINISH
▽▽▽▽	SUPER FINE FINISH

REMARKS

図面関係 DWG. FOR REFERENCE
1. 軸系装置 (5124200)
ARRANGEMENT OF SHAFTING
2. 中間軸 (5124201)
INTERMEDIATE SHAFT
3. 推進器 (5124700)
PROPELLER

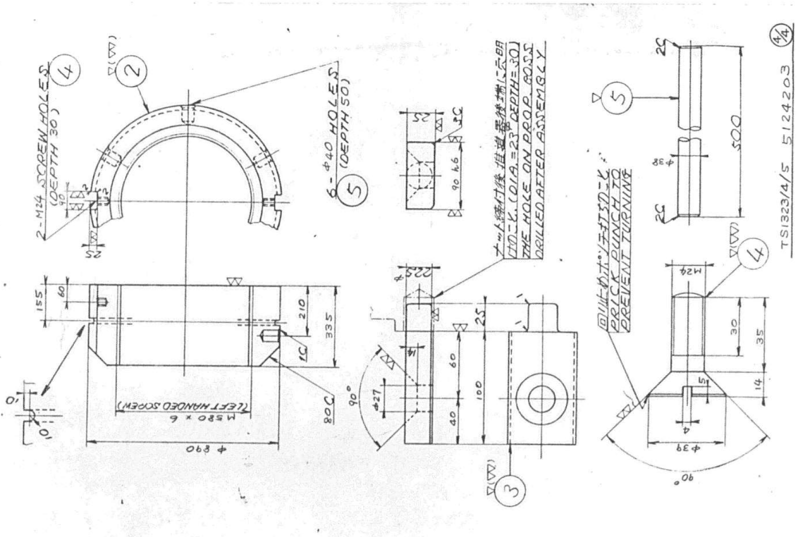
検査関係 INSPECTION
1. 船級: ABS
CLASSIFICATION
2. 全ての試験，検査はABS規則に従って行うこと
ALL TESTS & INSPECTION TO BE DONE IN ACCORDANCE WITH RULE.

工作関係 WORKMAN-SHIP
1. 符号①は外注品を使用する。但しリーマ穴は仕上げ代を残して納入されるので当所において仕上がり完成のこと。
REAMER HOLES OF NO.① TO BE FINISH MACHINED IN TAMANO WORKS.

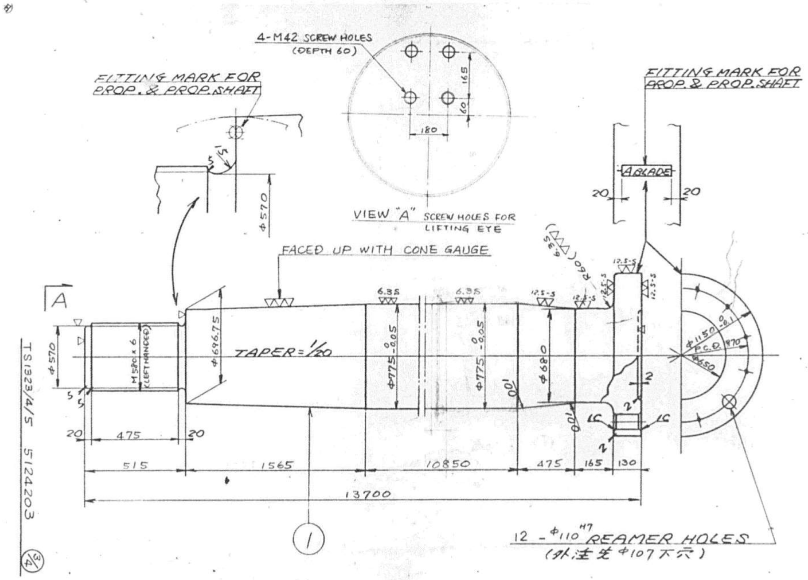
符号 NO.	名称 NAME	材料 MATERIAL	試験片 TEST PIECE	常備 USE	予備 SPARE	合計 TOTAL	関係工場 WORK SHOP	1個 ONE	合計 TOTAL	記事 REMARKS
				製造個数 QUANTITY				重量 WEIGHT (KG)		
5	BAR SPANNER	MILD STEEL SS41B		2 (TOOL)		2				5224209
4	BOLT	MILD STEEL SS41B		1		1				"
3	STOPPER	MILD STEEL SS41P		1		1				5224209
2	NUT	FORGED STEEL SF45A		1		1		875	875	5224203 外注品使用
1	PROPELLER SHAFT	FORGED STEEL ABS GRADE2	◎	1		1	き.く㊥	49,440	49,440	5224203 外注品使用

製造個数は1隻分を示す
QUANTITY PER SHIP IS GIVEN IN THIS TABLE. MAKE FOR THREE SHIP
3 隻分製造のこと

TS1323/4/5 5124203 (1/4)



2-M24 SCREW HOLES (DEPTH 30)
6-φ40 HOLES (DEPTH 50)
THE HOLE ON PROP. BOSS DRILLED AFTER ASSEMBLY
PRICK PUNCH TO PREVENT TURNING
M580×6 (LEFT HANDED SCREW)
TS1323/4/5 5124203



4-M42 SCREW HOLES (DEPTH 60)
FITTING MARK FOR PROP. & PROP. SHAFT
VIEW "A" SCREW HOLES FOR LIFTING EYE
FITTING MARK FOR PROP. & PROP. SHAFT
A BLADE
FACED UP WITH CONE GAUGE
TAPER=1/20
13700
12 - φ110 H7 REAMER HOLES
TS1323/4/5 5124203

1419

APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	APR/7/86	OETS/MES/257						

船殻関連工事有

FINISHED PLAN

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NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO. 1325
SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC.CHIEF

推進軸 抜出要領及 アイプレート位置

METHOD OF WITHDRAWING PROPELLER SHAFT & POSITION OF EYE PLATE

DATE (TEL 2235)

JOB NO. TS1323/24/25	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
JOBCLASSIF. NO. E-04-01	1/50	430105	5124500

(17 SHEETS WITH COVER)

PLAN RECORD			
ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	July/7/86 J.M

DWG.NO. 5124500 (i)

PROCEDURE OF WITHDRAWING THE PROPELLER SHAFT

1. DISMANTLING THE PROPELLER

1) Drain off L.O. in the stern tube L.O. system.

2) Remove the guard ring for the aft stern tube sealing.

3) Disconnect the chrome liner of the aft stern tube sealing from the propeller hub.

4) Remove the propeller cap.

5) Hang the propeller by using the chain-blocks and etc.

6) Dismantle the propeller from the propeller shaft by the method discribed on Dwg. No. 5124000 "OPERATION MANUAL OF PUSH-UP & PULL-OUT FOR KEYLESS PROPELLER".

2. WITHDRAWING THE PROPELLER SHAFT INBOARD

1) Loosen the clamp ring of the forward stern tube sealing.

2) Disconnect the forward stern tube sealing and adapter box from the forward end of stern tube and keep its position with wire rope.

3) Disconnect the coupling bolts of both flanges of the intermediate shaft and foundation bolts of the interm. shaft bearing.

4) Fix the interm. shaft bearings to the shaft by special tool shown in attached FIG.1.

5) Lift up the No.2 interm. shaft above about 1300mm from shaft center by using two set of geared trolley. (Position Ⓐ)

6) Shift the No.2 interm. shaft forward to about 1000mm from the bulkhead by using the geared trolly. (Position Ⓑ)

7) Swing the fore end of No.2 interm. shaft to starboard side by using eye plate ③.

8) Shift the No.2 interm. shaft forward up to 500mm from bulkhead by using eye plate ②.

9) Swing the aft end of No.2 interm. shaft to the starboard side by using eye plate ⑦ & ⑧. (Position Ⓒ)

10) Withdraw the propeller shaft inboard by using two sets of geared trolley. (Position Ⓓ)

3. WITHDRAWING THE PROPELLER SHAFT OUTBOARD

1) Cut off the No.1 side stringer as marked with welding bead line painted in red.

2) Withdraw the propeller shaft inboard by the same procedure of item 2. (Position Ⓓ)

3) Lift up the propeller shaft above 1300mm from shaft center by using two set of geared trolleys.

4) Shift the propeller shaft forward by using two sets of geared trolly. (Positon Ⓔ)

5) Fit the eye plate shown in attached FIG. 2 on the aft end of propeller shaft. (The eye plate shall be supplied as special tool.)

6) Swing the fore end of propeller shaft by using eye plate ⑤. (Position Ⓕ)

7) Hang the fore end of propeller shaft by dock yard's crane.

8) Hang the aft part of propeller shaft by fore geared trolley instead of aft geared trolley.

9) Hang the eye plate provided on aft end of propeller shaft by aft geared trolley, then release the load of fore geared trolley.

10) Raise up the propeller shaft through the opening by using the aft geared trolley and dock yard's crane. (Position Ⓖ1 - Ⓗ)

11) Withdraw the propeller shaft outboard by dock yard's crane.

4. NOTE

1) Chain-blocks and necessary accessory, i.e., wireropes, shackles to be prepared by the dock yard.

1420

REMARKS

1. REFERENCE DRAWING

1) Arrangement of shafting ------------------ (Dwg. No. 5124200)

2) Intermediate shaft ----------------------- (Dwg. No. 5124201)

3) Propeller shaft -------------------------- (Dwg. No. 5124203)

4) Intermediate shaft bearing -------------- (Dwg. No. 5124300)

2. WORKMAN-SHIP

1) Estimated weight

(1) No.1 Intermediate shaft ------------------ (23.6 tons)
(2) No.2 Intermediate shaft ------------------ (36.5 tons)
(3) Propeller shaft -------------------------- (49.4 tons)

(4) Intermediate shaft bearing ----------- (2.1 tons)

2) Marks ①~⑨ show eye plates.

3) Eye plates to be welded strictly.

4) Cutting places of No.1 side stringer (& FR.40, 44 web frame) to be marked with weldig bead and the bead line to be painted in red.

5) Eye plates to be manufactured in accordance with this drawing.

6) Eye plates not to be loaded over rated load.

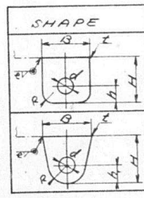
7) Capacity of geared trolley per each ------ (30 tons)

8) Geared trolley to be used within 15° inclination.

推進軸抜出用アイプレート

EYE PLATES FOR WITHDRAWING PROPELLER SHAFT.

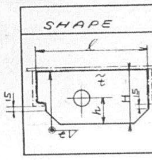
X TYPE



(MM)

SHAPE	KIND	LIFT WEIGHT (TON)	B	H	h	R	d	t	e	装備個数 QUANT. PER SHIP
	X-1	1	110	130	48	40	40	12~13	8	
	X-2	2	140	100~160	58	40	40	14~16	9	
	X-3	3	170	150~170	75	50	50	14~16	9	
	X-5P	5	200	200~220	98	65	65	18~20	12	
	X-10P	10	270	210~260	105	105	70	20~23	13	1
	X-15P	15	330	285~340	135	135	90	23~25	15	1
	X-20P	20	380	300~360	150	150	100	25~28	16	
	X-25P	25	400	310~370	150	150	100	28~30	18	

L TYPE



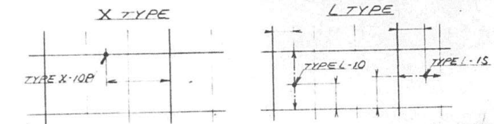
(MM)

SHAPE	KIND	LIFT WEIGHT (TON)	l	H	h	d	t	e	装備個数 QUANT. PER SHIP
	L-1	1	≤1000	100	50	50	9	5	
	L-3	3	"	125	50	50	16	8	
	L-5	5	"	150	75	75	19	8	
	L-10	10	"	180	80	60	25	9	
	L-15	15	"	220	110	85	28	10	1
	L-20	20	≤1000	250	125	85	30	11	4
	L-25	25	≤1000	310	150	100	32	13	3

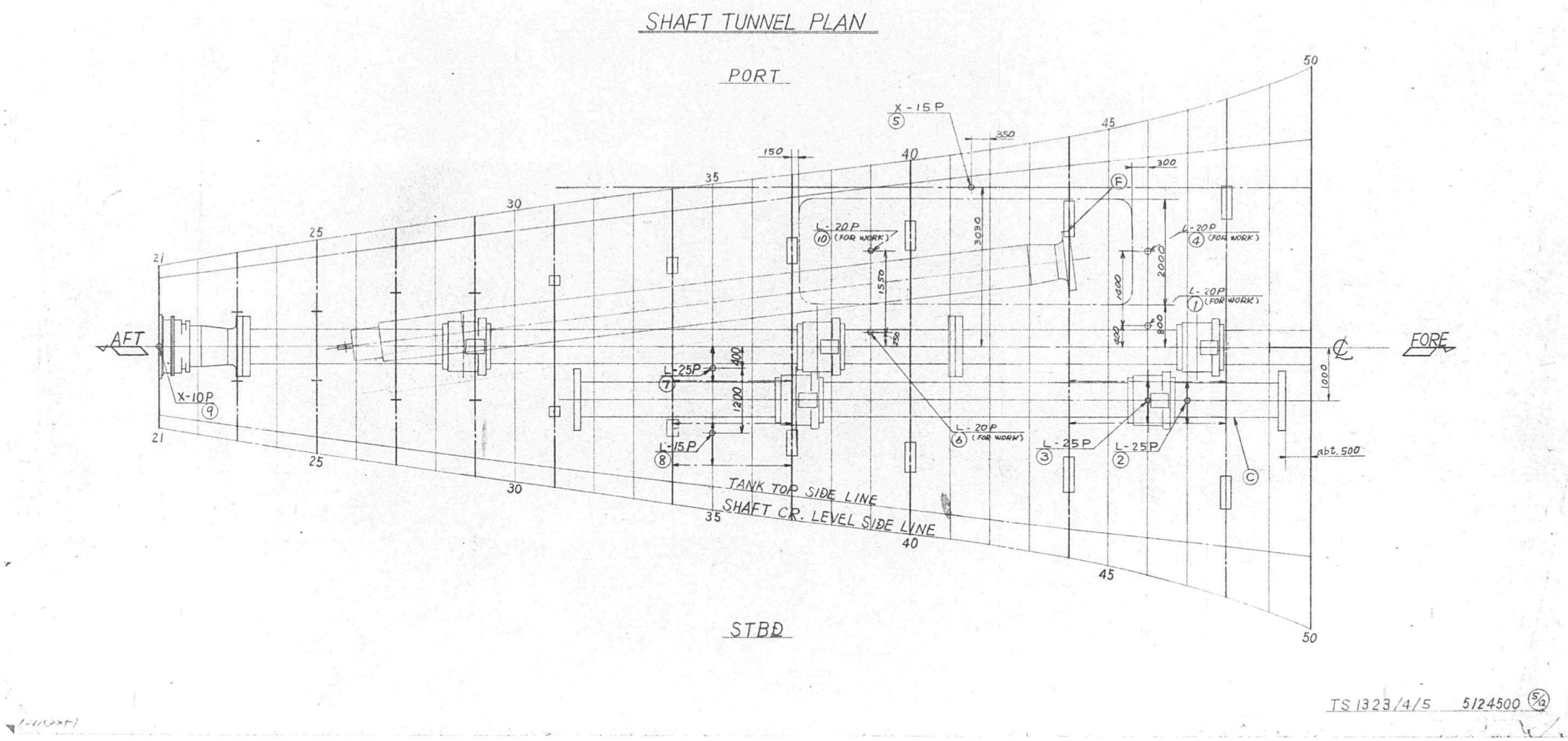
MATERIAL---SIMILAR TO HULL MATERIAL

INDICATION IN DRAWING

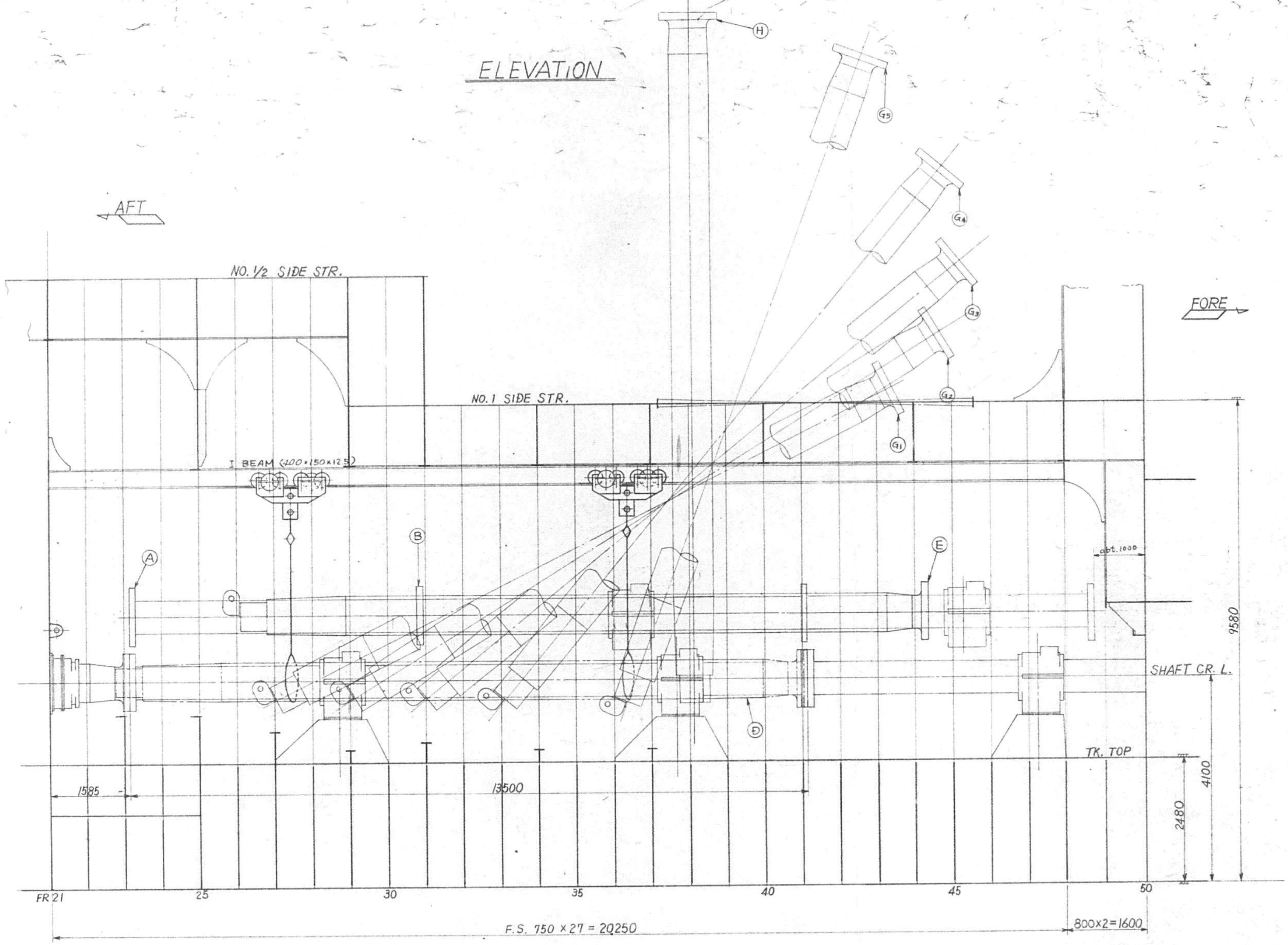
X TYPE L TYPE



1421

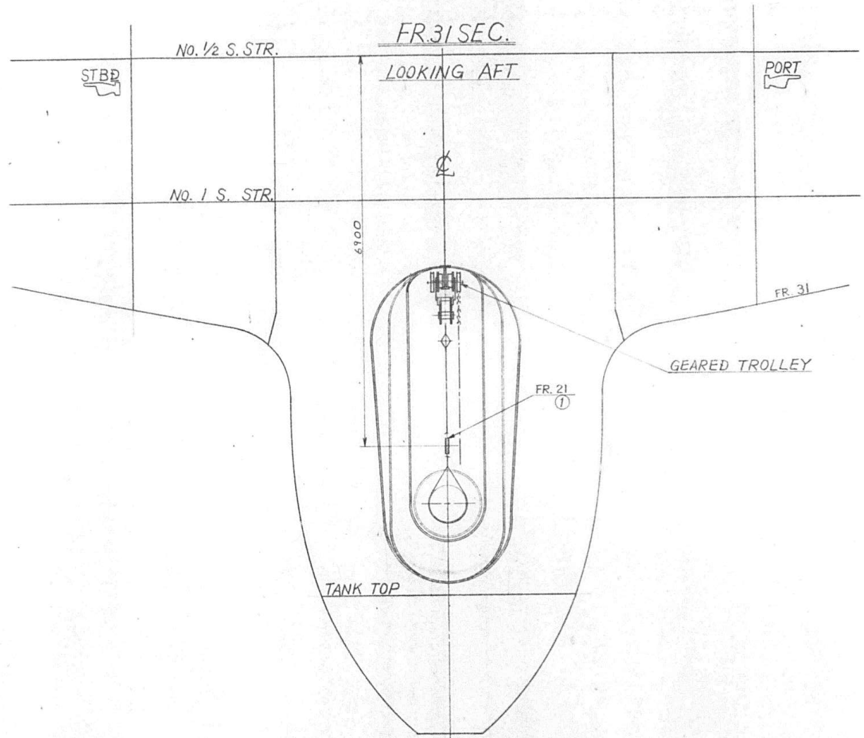

SHAFT TUNNEL PLAN
PORT
STBD
AFT
FORE
X-15P
X-10P
L-20P (FOR WORK)
L-25P
L-15P
TANK TOP SIDE LINE
SHAFT CR. LEVEL SIDE LINE
abt. 500
TS 1323/4/5 5124500

1422

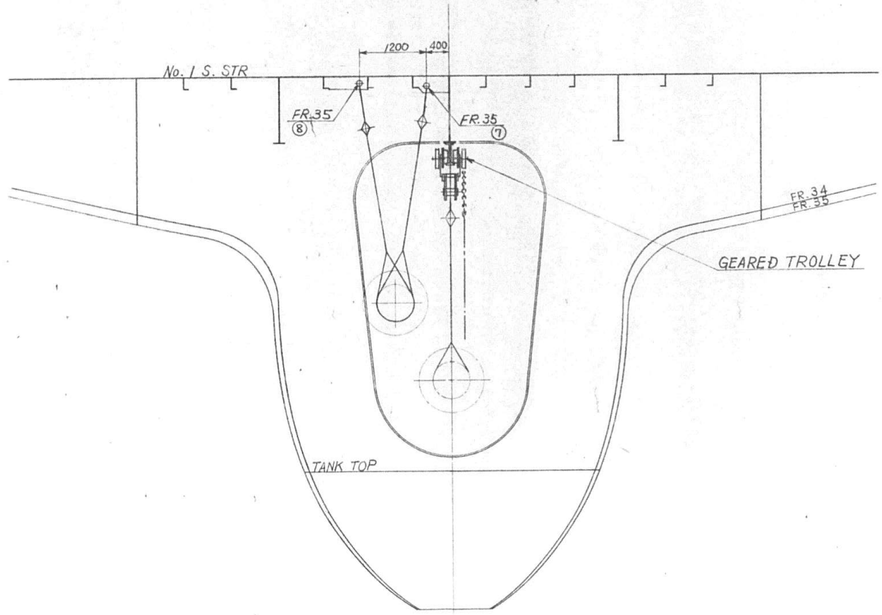


TS 1323/4/5 5124500

1423



TS 1323/4/5 5124500 (7/12)

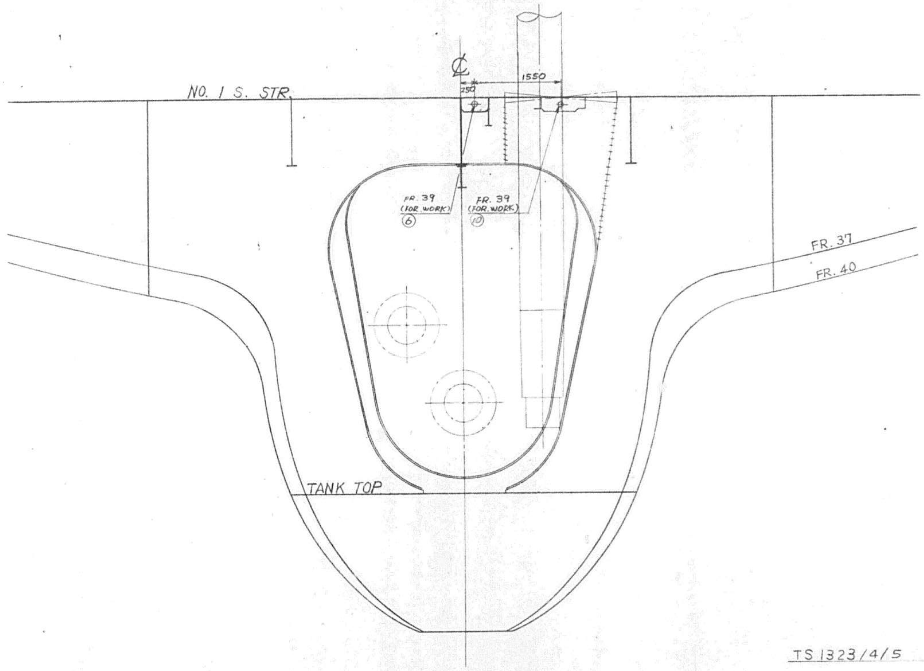


TS 1323/4/5 5124500 (8/12)

1424

FR. 40~37 SEC.

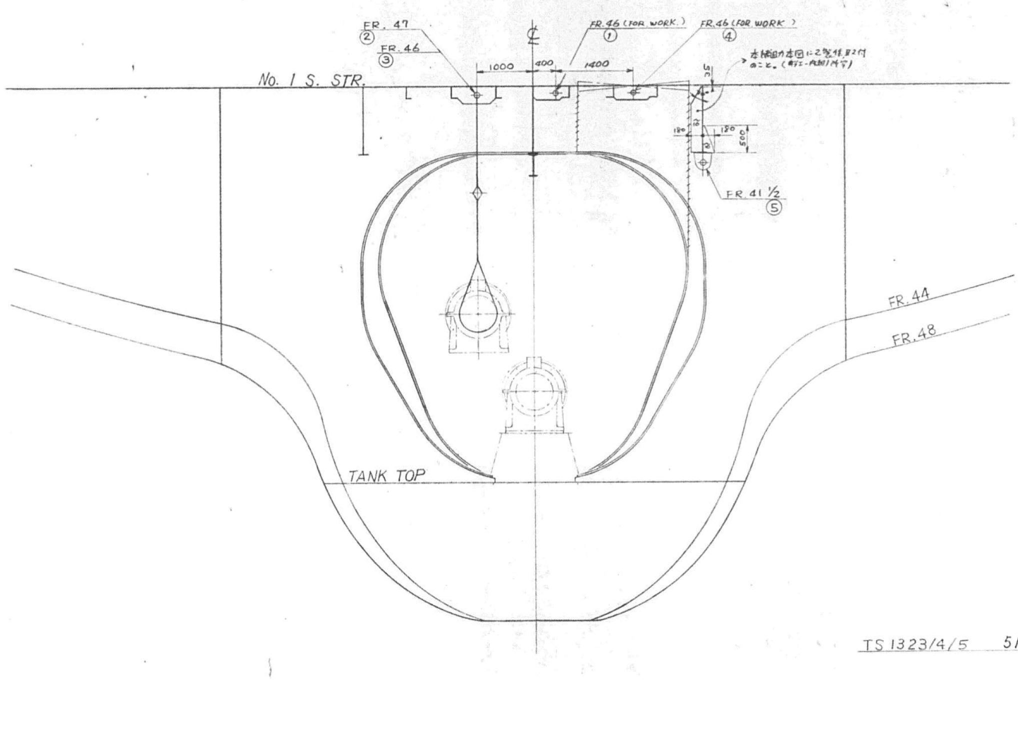
LOOKING AFT



TS 1323/4/5 5124500 (9/12)

FR. 48~44 SEC.

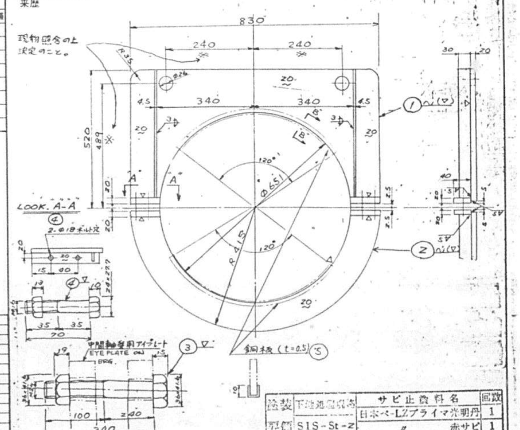
LOOKING AFT



TS 1323/4/5 5124500 (10/12)

1425

ATTACHED FIG. 1



塗装	下地処理	サビ止資料名	回数
		日本ペーLZプライマ光明丹	1
要領	SIS-St-2	〃 赤サビ	1

注記:

1. 本品は推進軸を抜き出す際に、中間軸と中間軸受を共に吊り上げる場合に、中間軸受の固定用として使用する。THIS PARTS ARE USED FOR FIX OF INTERM. SHAFT BEARINGS.
2. 本品は船主に要具として支給する。THIS PARTS ARE SUPPLIED TO OWNER
3. 製造表は1隻分を示す。3隻分製作のこと。MANUFACTURING TABLE SHOWS QUANTITY FOR ONE VESSEL. MAKE FOR THREE VESSEL.

符号 NO.	名称 NAME	材料 MATERIAL	試験片 TEST PIECE	常備 USE	予備 SPARE	合計 TOTAL	関係工場 WORK SHOP	1個 ONE 重量 WEIGHT (KG)	合計 TOTAL 重量 WEIGHT (KG)	記事 REMARKS
5	COPPER PLATE	COPPER		4		4	きく			
4	BOLT & NUT	MILD STEEL SS41		8 SETS		8 SETS	きく	0.21	0.84	
3	BOLT & NUT	〃		4 SETS		4 SETS	きく	1.5	3.0	
2	STOPPER PLATE	〃		2		2	きく	17.5	17.5	
1	STOPPER PLATE	MILD STEEL SS41		2		2	きく⑤	42.3	42.3	

SHIP DESIGN DEPARTMENT
工事番号 T.S.1.3.2.3. 工事区分 E.04.01 S.NO. 1323/4/5

SEC. CHIEF / ASSIST. CHIEF / CHARGEENG'R / STAFF J. Morimoto / DRAWER / DATE

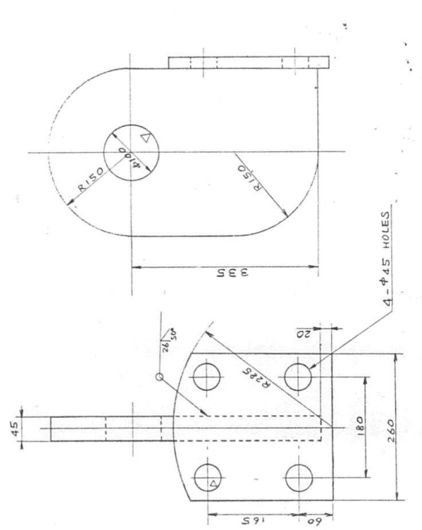
中間軸受移動防止用要具
LOCKING DEVICE FOR INTERM. SHAFT BEARING

試験力 TEST SCALE — CLASSIFICATION No. DRAWING No. ~~5124307~~

TS1323/4/5 5124500 (11/12)

HISTORY

ATTACHED FIG 2



MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT OUTFIT. DESIGN SECT. MACHINERY GROUP
SHIP'S NO. 1323/24/25
SHIP'S NAME

SEC. CHIEF / ASSIST. CHIEF / CHARGE ENG'R J. Morimoto / STAFF / DATE (TEL)

推進軸吊り上げ用アイプレート
EYE PLATE FOR LIFTING OF PROP. SHAFT

JOB NO. / JOB CLASSIF. NO. / SCALE / DRAWING NO. ~~5124503~~

TS1323/4/5 5124500 (12/12)

1-a

図面来歴記入欄 PLAN RECORD

REV. NO.	MARK	DESCRIPTION	BY	DATE
ORIG	–	Refer to next page		
F	–	Prepared as finished plan for S.No. 1158		

NO. 1158	JAMES LYKES
~~NO. 1159~~	~~JOSEPH LYKES~~
~~NO. 1164~~	~~SOLON TURMAN~~

Total 16 sheets

出図種類 A:承認 B:承認申請 C:打合用 D:工事用 E:参考 F:不承認 G:承認申請中 H:仮図 J:完成図 K:再承認申請

REQ. NO.

SHIP DESIGNING DEPARTMENT
ENGINE/OUTFIT DESIGNING SECTION

APPROVED H. Masakane
CHECKED S. Yamaguchi

推進軸抜出要領及びアイプレート位置
METHOD OF WITHDRAWING PROPELLER SHAFT & POSITION OF EYE PLATE

ORDER 02-15800 ~~02-15900~~ ~~02-16400~~ | ITEM 0300 | DRAWING NO. GA-34500-F (MES DWG NO. 5124500) | LYKES REF. NO. 430105

1-b

PLAN RECORD

REV. NO	MARK	DESCRIPTION	BY	DATE
ORIG.	–	Prepared for MHI KOBE S.NO. 1158, 1159 & 1164. Altered MES original drawing by MHI practice. Difference between MHI & MES (1) Position of eye plate (2) Cutting dimension of NO.1 side stringer		May 19, 1986

技術資料 A

1-c

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	APR/7/86	LETS/MES/287						

船殻関連工事有

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SHIPYARD AND SHIP'S NO. & NAME

~~MITSUI TAMANO~~		MITSUBISHI KOBE	
NO. 1323	~~DOCTOR LYKES~~	NO. 1158	JAMES LYKES
NO. 1324	~~ALMERIA LYKES~~	NO. 1159	~~JOSEPH LYKES~~
NO. 1325	~~TILLIE LYKES~~	NO. 1164	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER | SHIP'S NO. | SHIP'S NAME

OUTFITTING DESIGN SECTION
SEC. CHIEF S. Nishiura
ASSIST. CHIEF
CHARGE ENG'R A. Morimoto
STAFF
DATE (TEL 2235)

推進軸 抜出要領及 アイプレート位置
METHOD OF WITHDRAWING PROPELLER SHAFT & POSITION OF EYE PLATE

JOB NO. TS1323/24/25 | JOB CLASSIF. NO. E-04-01 | SCALE 1/50 | LYKES REF. NO. 430105 | MITSUI DRAWING NO. 5124500

(17 SHEETS WITH COVER)

1-d

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		WAS PREPARED FOR S.NO. 1323 AS FINISHED PLAN.	APR/7/86

DWG. NO. 5124500

1427

PROCEDURE OF WITHDRAWING THE PROPELLER SHAFT

1. DISMANTLING THE PROPELLER

1) Drain off L.O. in the stern tube L.O. system.

2) Remove the guard ring for the aft stern tube sealing.

3) Disconnect the chrome liner of the aft stern tube sealing from the propeller hub.

4) Remove the propeller cap.

5) Hang the propeller by using the chain-blocks and etc.

6) Dismantle the propeller from the propeller shaft by the method discribed on Dwg. No. 5124000 "OPERATION MANUAL OF PUSH-UP & PULL-OUT FOR KEYLESS PROPELLER".

2. WITHDRAWING THE PROPELLER SHAFT INBOARD

1) Loosen the clamp ring of the forward stern tube sealing.

2) Disconnect the forward stern tube sealing and adapter box from the forward end of stern tube and keep its position with wire rope.

3) Disconnect the coupling bolts of both flanges of the intermediate shaft and foundation bolts of the interm. shaft bearing.

4) Fix the interm. shaft bearings to the shaft by special tool shown in attached FIG.1.

5) Lift up the No.2 interm. shaft above about 1300mm from shaft center by using two set of geared trolley.
(Position Ⓐ)

6) Shift the No.2 interm. shaft forward to about 1000mm from the bulkhead by using the geared trolly.
(Position Ⓑ)

7) Swing the fore end of No.2 interm. shaft to starboard side,

and at the same time,
shift the No.2 interm. shaft forward up to 500mm from bulkhead by using eye plate ② & ①

8) Swing the aft end of No.2 interm. shaft to the starboard side by using eye plate ③ & ④.
(Position Ⓒ)

9) Withdraw the propeller shaft inboard by using two sets of geared trolley.
(Position Ⓓ)

3. WITHDRAWING THE PROPELLER SHAFT OUTBOARD

1) Cut off the No.1 side stringer as marked with welding bead line painted in red.

2) Withdraw the propeller shaft inboard by the same procedure of item 2.
(Position Ⓓ)

3) Lift up the propeller shaft above 1300mm from shaft center by using two set of geared trolleys.

4) Shift the propeller shaft forward by using two sets of geared trolly.
(Positon Ⓔ)

5) Fit the eye plate shown in attached FIG. 2 on the aft end of propeller shaft. (The eye plate shall be supplied as special tool.)

6) Swing the fore end of propeller shaft by using eye plate ⑤.
(Position Ⓕ)

7) Hang the fore end of propeller shaft by dock yard's crane.

8) Hang the aft part of propeller shaft by fore geared trolley instead of aft geared trolley.

9) Hang the eye plate provided on aft end of propeller shaft by aft geared trolley, then release the load of fore geared trolley.

10) Raise up the propeller shaft through the opening by using the aft geared trolley and dock yard's crane.
(Position Ⓖ1 - Ⓗ)

11) Withdraw the propeller shaft outboard by dock yard's crane.

4. NOTE

1) Chain-blocks and necessary accessory, i.e., wireropes, shackles to be prepared by the dock yard.

REMARKS

1. REFERENCE DRAWING

1) Arrangement of shafting ------------------ (Dwg. No. 5124200)

2) Intermediate shaft ------------------------ (Dwg. No. 5124201)

3) Propeller shaft ---------------------------- (Dwg. No. 5124203)

4) Intermediate shaft bearing ----------------- (Dwg. No. 5124300)

2. WORKMAN-SHIP

1) Estimated weight

(1) No.1 Intermediate shaft -------------------- (23.6 tons)
(2) No.2 Intermediate shaft -------------- (36.5 tons)
(3) Propeller shaft ------------------------ (49.4 tons)

(4) Intermediate shaft bearing ----------- (2.1 tons)

2) Marks ①~⑥ show eye plates for withdrawal of propeller shaft.

3) Eye plates to be welded strictly.

4) Cutting places of No.1 side stringer (& FR.40. web frame) to be marked with weldig bead and the bead line to be painted in red.

5) Eye plates to be manufactured in accordance with this drawing.

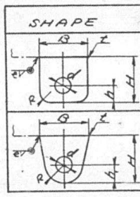
6) Eye plates not to be loaded over rated load.

7) Capacity of geared trolley per each ------ (30 tons)

8) Geared trolley to be used within 15° inclination.

推進軸抜出用アイプレート
EYE PLATES FOR WITHDRAWING PROPELLER SHAFT

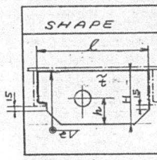
X TYPE



(MM)

SHAPE	KIND	LIFT. WEIGHT (TON)	B	H	h	R	d	t	e	所定個数 QUANT. PER SHIP
	X-1	1	110	130	48	40	40	12~13	8	
	X-2	2	140	100~160	58	40	40	14~16	9	
	X-3	3	170	150~170	75	50	50	14~16	9	
	X-5P	5	200	200~220	98	65	65	18~20	12	
	X-10P	10	270	210~260	105	105	70	20~23	13	1
	X-15P	15	330	285~340	135	135	90	23~25	15	1
	X-20P	20	380	300~360	150	150	100	25~28	16	
	X-25P	25	400	310~370	150	150	100	28~30	18	

L TYPE



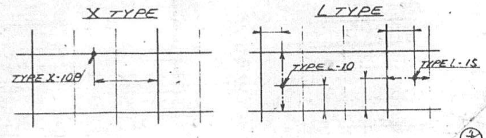
(MM)

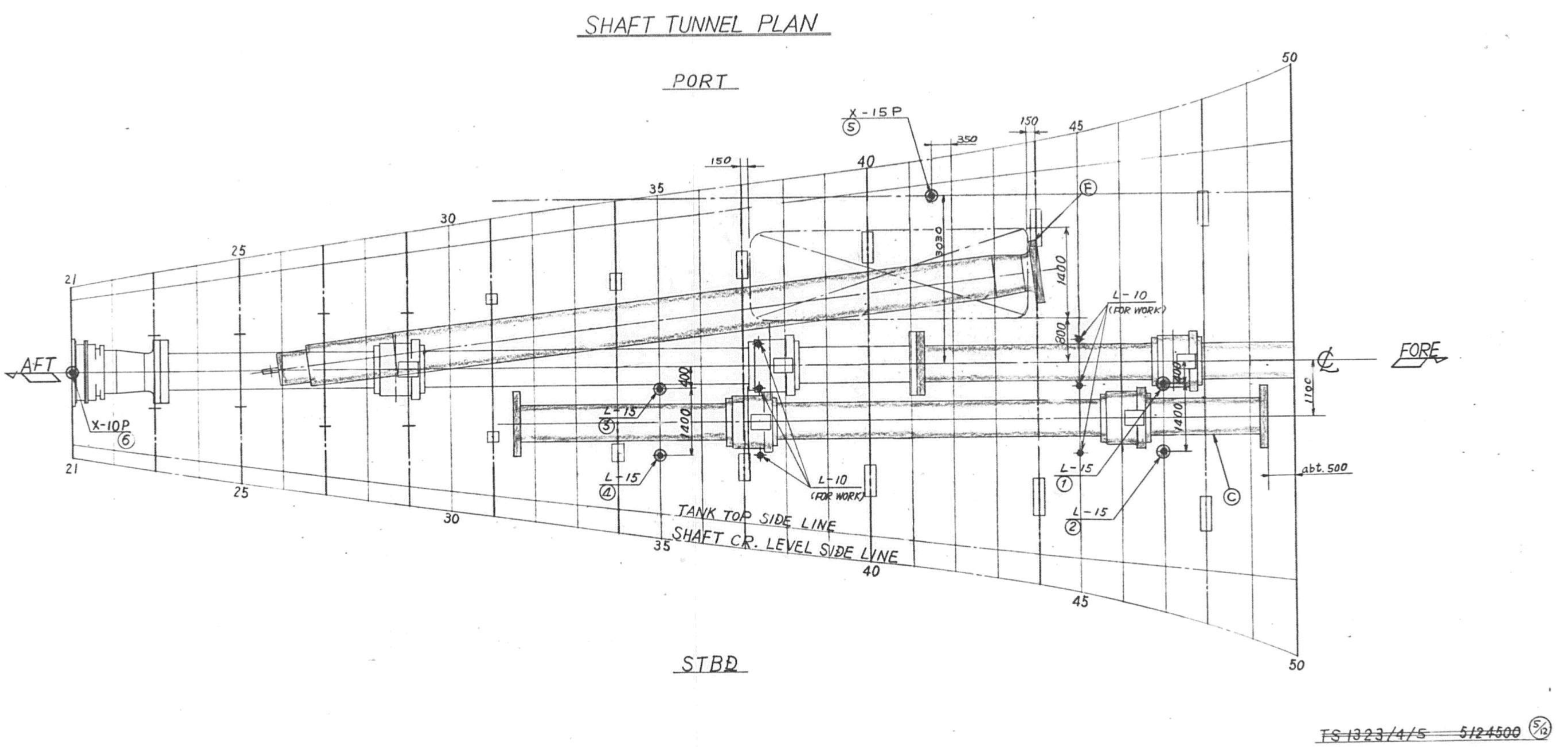
SHAPE	KIND	LIFT WEIGHT (TON)	ℓ	H	h	d	t	e	所定個数 QUANT. PER SHIP
	L-1	1	≤1000	100	50	50	9	5	
	L-3	3	〃	125	50	50	16	8	
	L-5	5	〃	150	75	75	19	8	
	L-10	10	〃	180	80	60	25	9	6 (For work)
	L-15	15	〃	220	110	85	28	10	4
	L-20	20	≤1000	250	125	85	30	11	
	L-25	25	≤1000	310	150	100	32	13	

MATERIAL---SIMILAR TO HULL MATERIAL

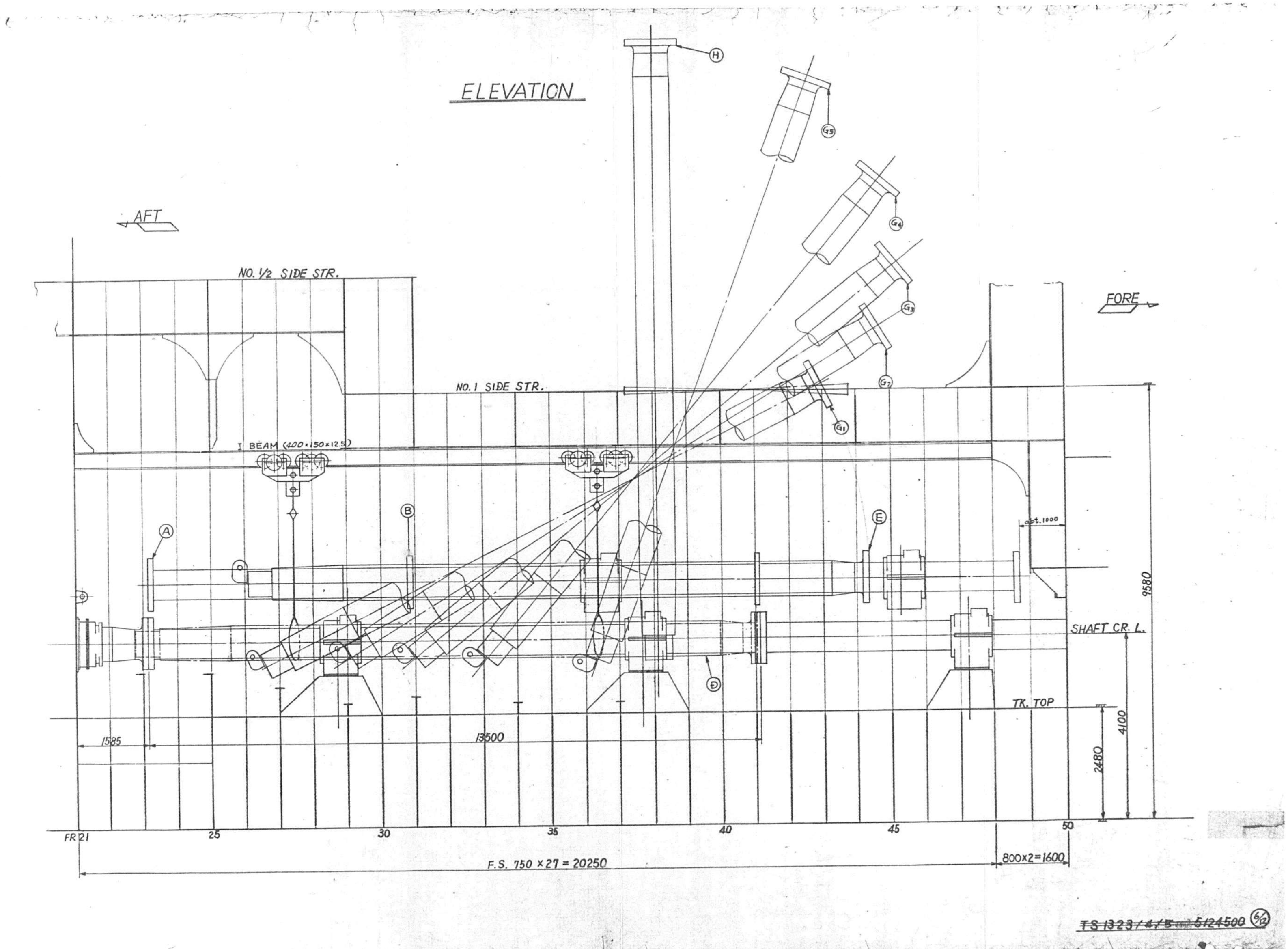
INDICATION IN DRAWING

X TYPE　　L TYPE



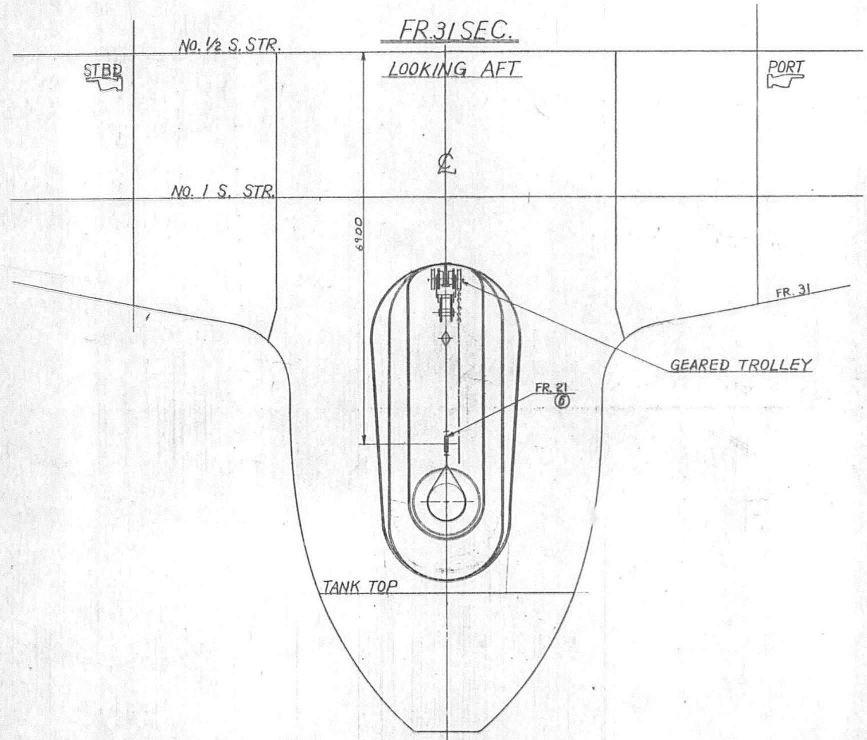

SHAFT TUNNEL PLAN
PORT
X-15P
5
150
350
150
45
50
40
35
30
25
21
F
1400
800
L-10
(FOR WORK)
AFT
FORE
400
L-15
3
1400
L-15
4
X-10P
6
L-10
(FOR WORK)
1100
L-15
1
L-15
2
C
abt. 500
TANK TOP SIDE LINE
SHAFT CR. LEVEL SIDE LINE
STBD
TS 1323/4/5 5124500

1429

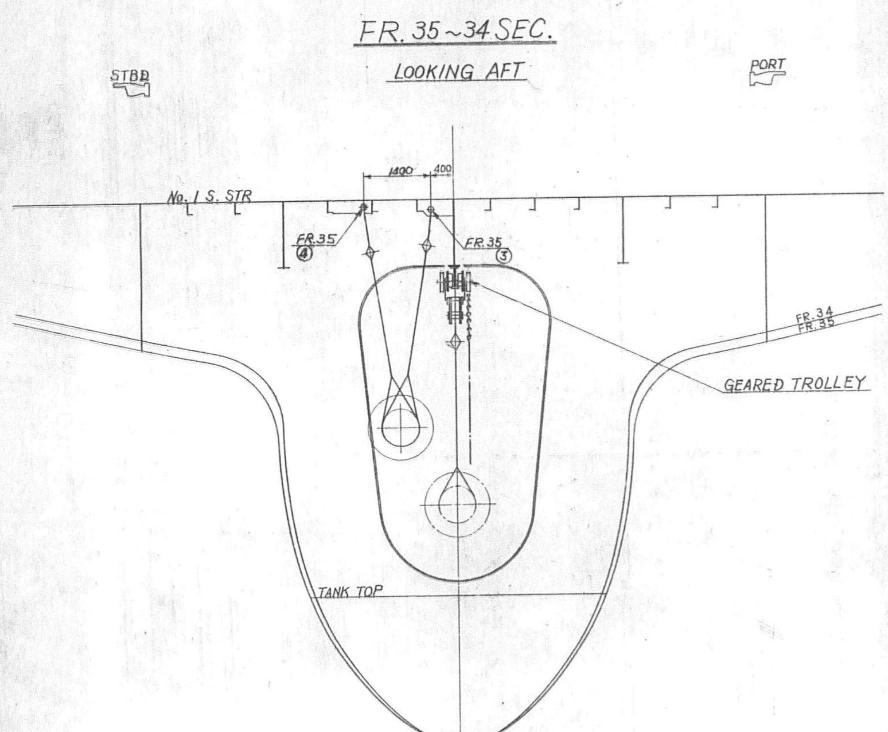


TS 1323/4/5 5124500

1430



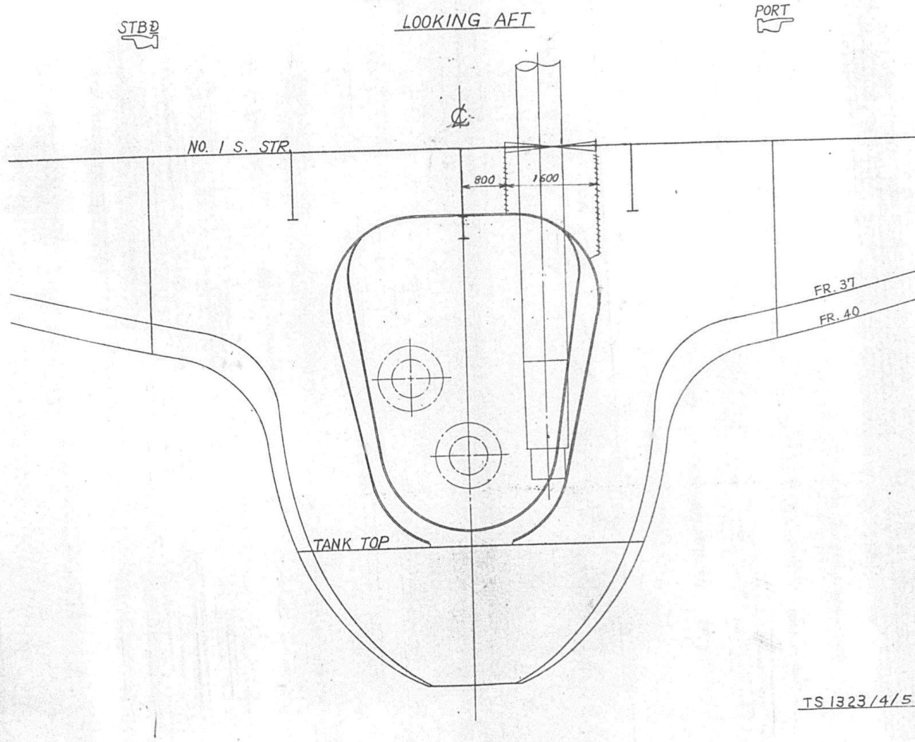
TS 1323/4/5 5124500 (7/12)



TS 1323/4/5 5124500 (8/12)

FR. 40~37 SEC.

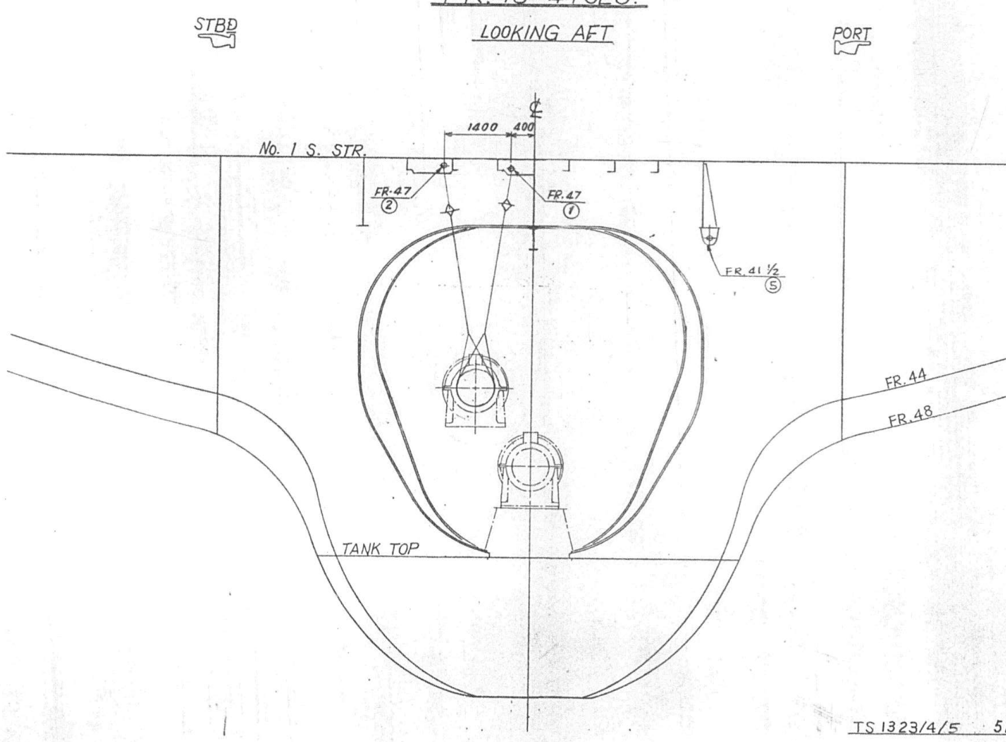
LOOKING AFT



TS 1323/4/5 5124500 (9/12)

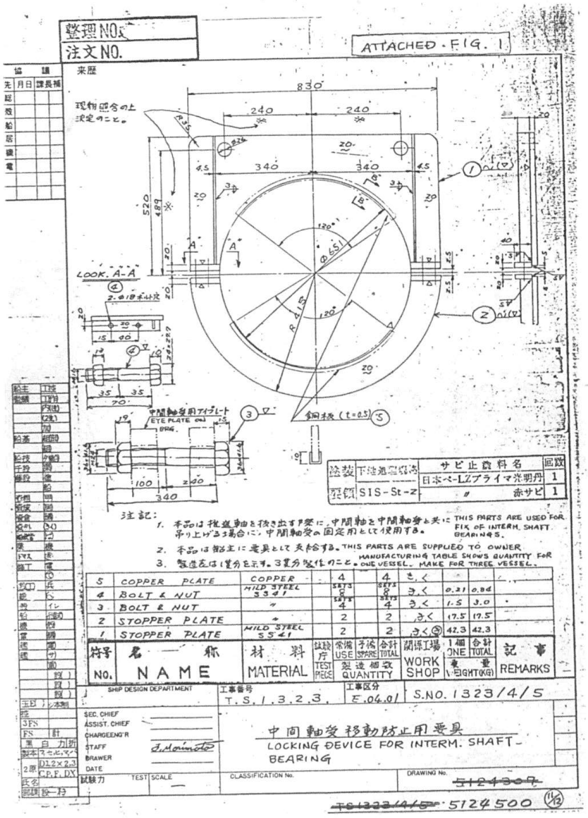
FR. 48~44 SEC.

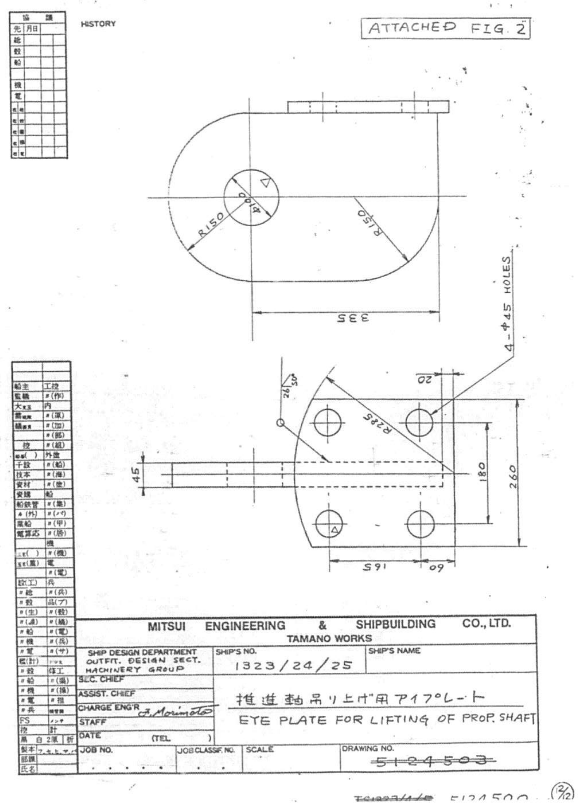
LOOKING AFT



TS 1323/4/5 5124500 (10/12)

1432


整理NO.
注文NO.
ATTACHED・FIG. 1
830
240
340
520
LOOK. A-A
鋼板（t=0.5）⑤
中間軸受用アイプレート
EYE PLATE ON BRG.
100
340
塗装 下塗塗装仕様 SIS-St-2
サビ止塗料名 日本ペーLZプライマ光明丹 1
赤サビ 1
注記:
1. 本品は推進軸を抜き出す際に、中間軸を中間軸受と共に吊り上げる場合に、中間軸受の固定用として使用する。 THIS PARTS ARE USED FOR FIX OF INTERM. SHAFT BEARINGS.
2. 本品は船主に要具として支給する。THIS PARTS ARE SUPPLIED TO OWNER
3. 製造表は1隻分を示す。3隻分製作のこと。MANUFACTURING TABLE SHOWS QUANTITY FOR ONE VESSEL. MAKE FOR THREE VESSEL.
5 COPPER PLATE COPPER 4 4 0.21 0.84
4 BOLT & NUT MILD STEEL SS41 8 SETS 8 SETS 0.21 0.84
3 BOLT & NUT 4 SETS 4 SETS 1.5 3.0
2 STOPPER PLATE 2 2 17.5 17.5
1 STOPPER PLATE MILD STEEL SS41 2 2 42.3 42.3
符号 NO. 名称 NAME 材料 MATERIAL 試験片 TEST PIECE 常備 USE 予備 SPARE 合計 TOTAL 製造個数 QUANTITY 関係工場 WORK SHOP 1個 ONE 合計 TOTAL 重量 WEIGHT(KG) 記事 REMARKS
SHIP DESIGN DEPARTMENT
工事番号 T.S.1.3.2.3.
工事区分 E.04.01
S.NO. 1323/4/5
SEC. CHIEF
ASSIST. CHIEF
CHARGEENG'R
STAFF
DRAWER
DATE
中間軸受移動防止用要具
LOCKING DEVICE FOR INTERM. SHAFT-BEARING
TEST SCALE
CLASSIFICATION No.
DRAWING No.
5124307
5124500
11/12


HISTORY
ATTACHED FIG. 2
R150
335
4-φ45 HOLES
R285
45
180
260
165
60
20
MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT
OUTFIT. DESIGN SECT. MACHINERY GROUP
SHIP'S NO. 1323/24/25
SHIP'S NAME
SEC. CHIEF
ASSIST. CHIEF
CHARGE ENG'R
STAFF
DATE
推進軸吊り上げ用アイプレート
EYE PLATE FOR LIFTING OF PROP. SHAFT
JOB NO.
JOB CLASSIF. NO.
SCALE
DRAWING NO.
5124503
5124500
2/12

1433

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	[illegible]	OFTS/MES/229						

APPROVAL OF OWNER & REGULATORY BODIES

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO. 1325
SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC.CHIEF
ASSIST.
CHARGE ENG'R
STAFF
DATE (TEL 2235)

軸系アライメント計算書

CALCULATION OF SHAFTING ALIGNMENT

JOB NO. TS1323/24/25
JOBCLASSIF.NO. E-04-01
SCALE
LYKES REF. NO. 430106
MITSUI DRAWING NO. 5124101

(6 SHEETS WITH COVER)

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	July/7/86 J.M

DWG.NO. 5124101 (1)

1. ORDER OF INSTALLATION

1) Align between the propeller shaft and the No.2 intermediate shaft.
2) Align between the No.2 intermediate shaft and No.1 intermediate shaft.
3) Align between the No.1 interm. shaft and the main engine.
4) Install the main engine and the interm. shaft bearings with holding down bolts after alignment control.
5) Connect all the coupling flanges in order from forward flange.

2. SHAFTING ALIGNMENT CONTROL PROCEDURE (REF. FIG.2)

1) The propeller shaft is laid down in place without coupled and deflected freely.
2) GAP & SAG between coupling flanges of the propeller shaft and No.2 interm. shaft are controlled as shown in FIG.2-a by adjusting the temporary supporter "A" & "B".
3) GAP & SAG between coupling flanges of the No.2 interm. shaft and No.1 interm. shaft are controlled as shown in FIG.2-b by adjusting the temporary supporter "C" & "D".
4) GAP & SAG between coupling flanges of the No.1 interm. shaft and the main engine output shaft are controlled as shown in FIG.2-c by adjusting the height of the main engine.
5) The height of the interm. shaft bearings are determined as follows.
   a) For No.1 & No.2 interm. shaft bearing

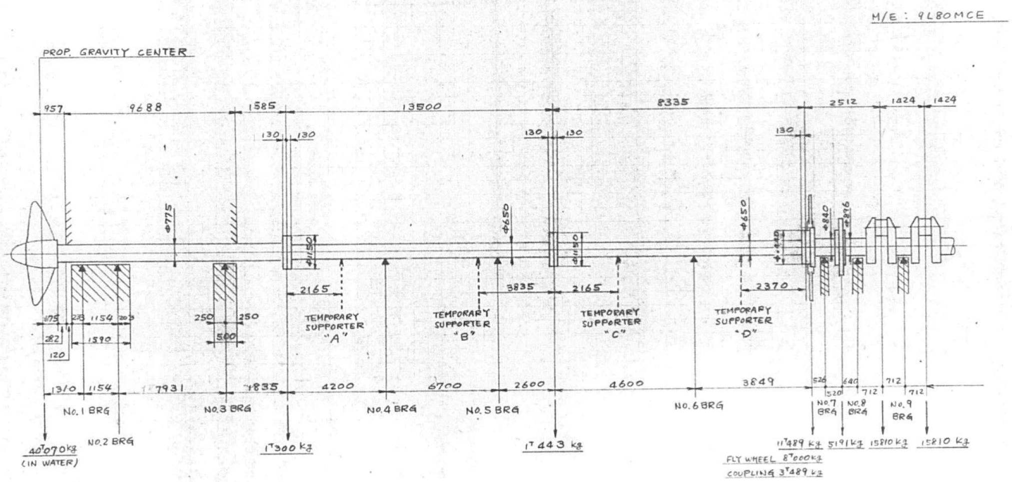
   The bearing is jacked up until the lower bearing metal touches to the interm. shaft.

   b) For No.3 interm. shaft bearing

   At first, slightly put the lower bearing metal to the interm. shaft. And then, the bearing is jacked up by the distance as shown in FIG.2-d.

3. NOTE

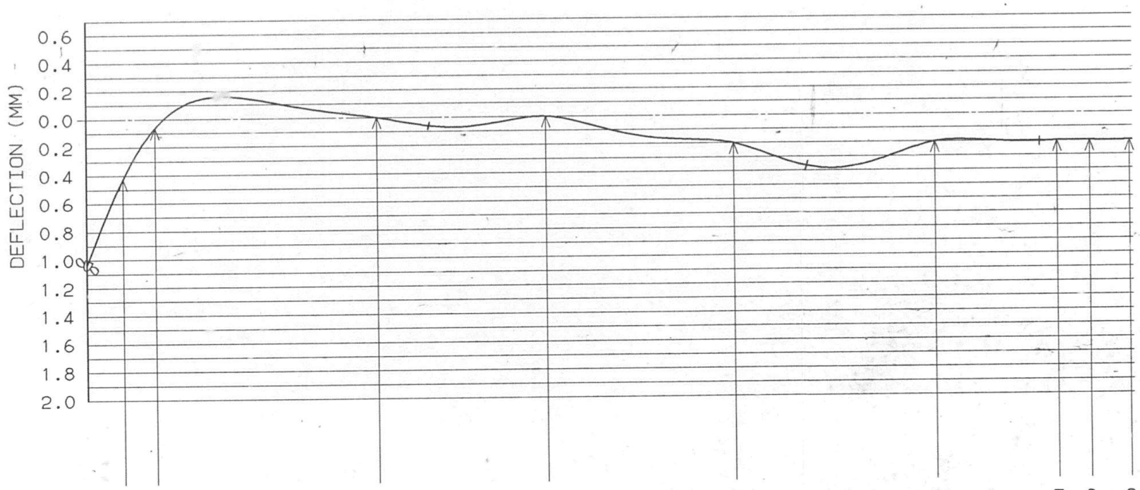
1) Shafting alignment shall be carried out when vessel is afloat.
2) The shafts are fixed with jackscrews to adjust transverse center.
3) Tolerance of GAP & SAG shall be ± 0.10 mm respectively.
4) The tolerance of adjusting the height of the interm. shaft bearing shall be ± 0.05 mm.



S.NO. 1323/4/5 CALCULATION DATA OF SHAFT ALIGNMENT

TS1323/4/5 5124101 (2/4)

FIG.1 TS1323/24/25 ALIGNMENT CURVE

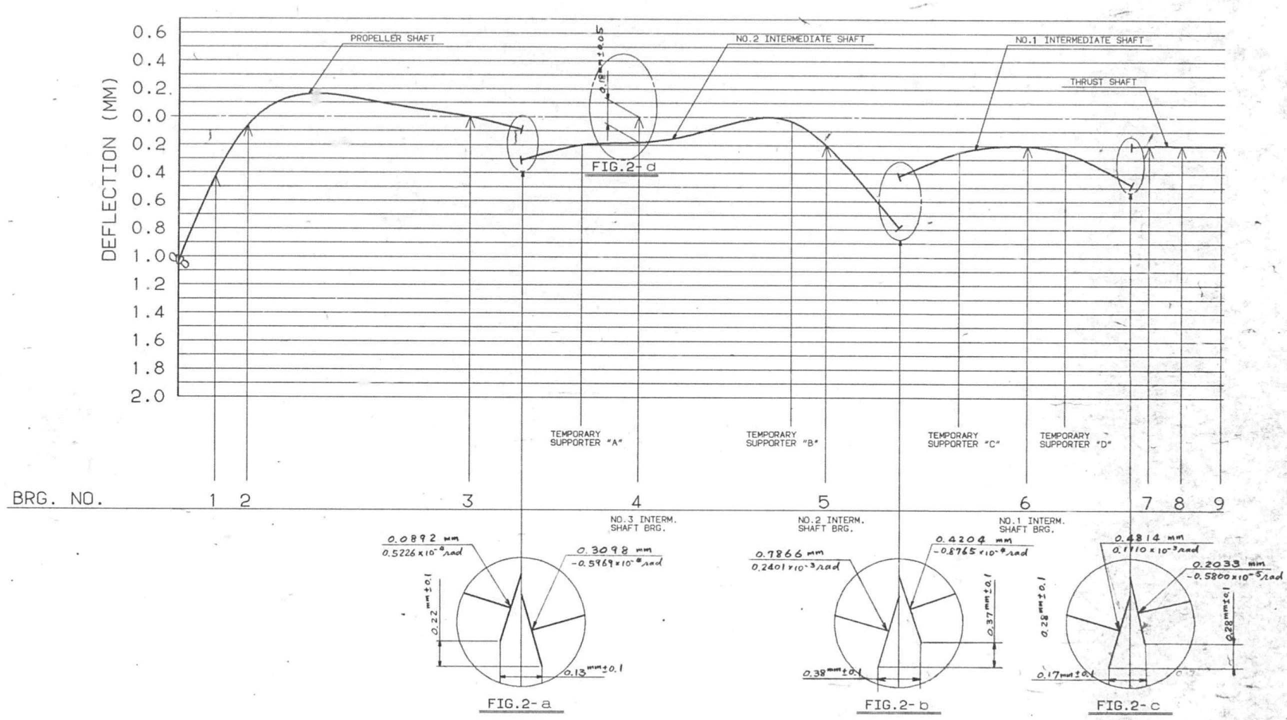


BRG. NO.	1	2	3	4	5	6	7	8	9
BRG. LOAD KG	46098	24199	17847	18359	18754	18214	24092	14328	11060
BRG. PRESS. KG/SQ CM	5.89		4.80	4.35	4.44	4.31	17.9	-	-

TS1323/4/5 8124101

1436

FIG.2 TS1323/24/25 SAG & GAP CURVE



TS1323/4/5 5124101

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	7/Nov/85	CTS/MES-384			5/Nov/85	T-8-2		

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
OUTFITTING DESIGN SECTION SEC. CHIEF
ASST. CHIEF
CHARGE
STAFF
DATE (TEL 2235)

SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

中間軸受組立

ASSEMBLY OF INTERMEDIATE SHAFT BEARING

JOB NO. TS1323/24/25
JOBCLASSIF. NO. E-04-01
SCALE
LYKES REF. NO. 430201
MITSUI DRAWING NO. 5124300

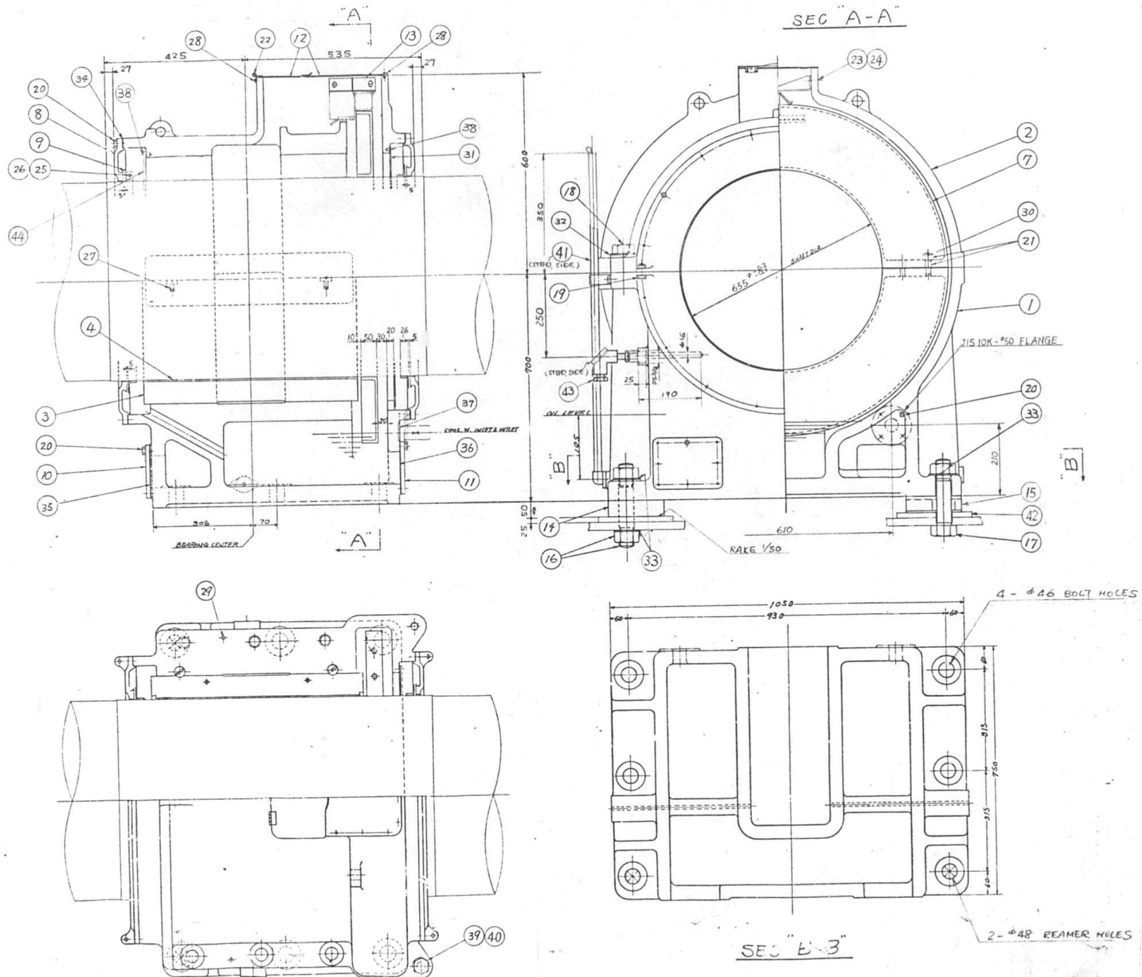
(3 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED	July/7/86
		PLAN, MADE APPLICABLE TO S.NO.1324 AND	J. M
		S.NO.1325	

DWG.NO. 5124300 (i)

1438



REMARKS

図面関係 REFERENCE DRAWING	工作関係 WORKMANSHIP
1. INTERM. SHAFT (5124201)	1. 軸受据付方向は軸系装置図によること 2. 中心寸法は現場照合の上決定のこと
2. DETAIL OF INTERM. SHAFT BEARING (5124308)	3. 塗装要領は注文書によること。
3. ARRANGEMENT OF SHAFTING (5124200)	4.
4. ( )	5. 潤滑油容量 約33ℓ (軸受1台分)
5 ( )	6. ビスネジはポンチ等で打って廻止め施行のこと

符号 NO.	名称 NAME	材料 MATERIAL	試験片 TEST PIECE	常備 USE	予備 SPARE	合計 TOTAL	関係工場 WORK SHOP	1個 ONE	合計 TOTAL	記事 REMARKS
44	RING PLATE	MILD STEEL SS00		1		1	<			外注品使用
43	RESISTANCE BULB	MAKER'S STANDARD		1		1				造船所手配
42	FIXED LINER	MILD STEEL SS41P		6		6		5.1	30.6	外注品使用
41	OIL LEVEL GAUGE	MILD STEEL DUCTILE IRON		SET 1		SET 1				〃
40	SPRING WASHER	HARD ST. WIRE SWRH 4		2		2				外注品使用
39	TAP BOLT	MILD STEEL SS41B		SETS 2		SETS 2		0.5	1.2	〃
38	SET SCREW	MILD STEEL SS41B		24		24				外注品使用
37	PACKING	NEOPLANE RUBER		2		2				THICK 1.5 mm 外注品使用
36	PACKING	NITRILE RUBBER N.B.R.		1		1				〃
35	PACKING	NEOPLANE RUBER		2		2				〃
34	PACKING	NITRILE RUBBER N.B.R		2		2				THICK 1.5 mm 外注品使用
33	SPRING WASHER	HARD STEEL WIRE SWRH 4		8		8				外注品使用
32	SPRING WASHER	HARD STEEL WIRE SWRH 4		4		4				
31	RING PLATE	MILD STEEL SS00		SET 1		SET 1				
30	SPRING WASHER	HARD STEEL WIRE SWRH 4		4		4				
29	TAPER PIN	MILD STEEL SS41B		2		2				
28	SET SCREW	MILD STEEL SS41B		12		12				
27	SET SCREW	MILD STEEL SS41B		4		4		0.01	0.4	
26	SPLIT PIN	STEEL WIRE SWRM3		4		4				
25	BOLT & NUT	MILD STEEL SS41B		SETS 4		SETS 4		0.07	0.3	
24	SPRING WASHER	HARD STEEL WIRE SWRH 4		2		2				
23	BOLT & NUT	MILD STEEL SS41B		2		2				
22	HINGE	MILD STEEL SS00		2		2				
21	TAP BOLT	MILD STEEL SS41B		SETS 4		SETS 4		0.2	0.8	
20	BOLT	MILD STEEL SS41B		66		66		0.06	4.0	
19	BOLT & NUT	MILD STEEL SS41B		SETS 4		SETS 4		0.1	0.4	
18	TAP BOLT	MILD STEEL SS41B		SETS 6		SETS 6	<	1.8	10.8	
17	BOLT & NUT	MILD STEEL SS41B		SETS 4		SETS 4	き <	4.8	19.2	
16	REAMER BOLT & NUT	MILD STEEL SS41B		SETS 2		SETS 2	き <	5.1	10.2	
15	CHOCK LINER	DUCTILE IRON FCD 40		4		4	き <	5.5	22.0	
14	CHOCK LINER	DUCTILE IRON FCD 40		2		2	き <	6.4	12.8	
13	OIL SCRAPER	MILD STEEL SS00		1		1	<	0.8	0.8	
12	UPPER COVER	MILD STEEL SS00		SET 1		SET 1		1.8	1.8	
11	LOWER SIDE COVER	MILD STEEL SS41P		1		1		6.8	6.8	
10	LOWER SIDE COVER	MILD STEEL SS41P		2		2		1.1	2.2	
9	OIL THROWER RING	MILD STEEL SS00		SETS 2		SETS 2		4.7	9.4	
8	SIDE COVER	DUCTILE IRON ASTM A-395		SETS 2		SETS 2		22.3	44.6	
7	OIL COLLAR	CAST IRON FC 20		SET 1		SET 1		51.0	51.0	
6										
5										
4	(LOWER) BEARING METAL	WHITE METAL WJ 2		1		1		21.8	21.8	
3	(LOWER) BACK METAL	MILD STEEL ASTM A-36		1		1		258	258	
2	BEARING COVER	DUCTILE IRON ASTM A-395		1		1		449	449	
1	BEARING BODY	DUCTILE IRON ASTM A-395		1		1	< ㊞	1140	1140	外注品使用

製造個数は1基分を示す。　3基分(9基分)製造のこと

SHIP DESIGN DEPART. MANAGER		
MACHIN. OUTFIT. DESIGN SEC.	TYPE 450	SHAFT DIA. φ655
SEC. CHIEF / ASSIST. CHIEF / CHARGE ENG'R / STAFF / DRAWER / DATE	中間軸受組立 ASSEMBLY OF INTERMEDIATE SHAFT BEARING	
REF. TEXT ① -6	SCALE / CLASSIFICATION NO.	DRAWING NO. 5124300

MITSUI SHIPBUILDING & ENGINEERING CO., LTD.

1439

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	27th MAR/85	OETS/MES-230			26th MAR/85	T-8-2		
A	2nd/APR/85	OETS/MES-253			17th MAY/85	T-8-2		
B	11th/SEP/85	OETS/MES-954			23rd/SEP/85	T-8-2		

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
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NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC. CHIEF
ASST.
CHARGE ENG'R MAR.-5.1987
SHIP DESIGN DEPARTMENT
DATE (TEL 2235)

船尾管軸受
STERN TUBE BEARING

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25		430203	5124302
JOBCLASSIF. NO. E-04-01			

(11 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED	July/7/86
		PLAN, MADE APPLICABLE TO S.NO.1324 AND	J.M
		S.NO.1325	

DWG.NO. 5124302 (i)

ORDER LIST

本表の製造個数は1隻分を示す。
QUANTITY PER SHIP IS GIVEN IN THIS TABLE
3隻分製造のこと。
MAKE FOR THREE SHIPS.

番号 NO.	名称 NAME	材料 MATERIAL	試験片 TEST PIECE	常備 USE	予備 SPARE	合計 TOTAL	関係工場 WORK SHOP	1個 ONE 重量 WEIGHT (KG)	合計 TOTAL 重量 WEIGHT (KG)	記事 REMARKS
27	PLUG	NABAL BRASS C4622B		1		1	ⓜ			5224302
26	DISTANCE RING	MILD STEEL SS41P		1		1	ⓜ	60	60	(TWO DIVIDED) 5224302
25	SUPPORTER	MILD STEEL SS41		1		1	m.き.く			5224302
24	SUPPORTER	MILD STEEL SS41		1		1	m.き.く			〃
23	BOLT	MILD STEEL SS41B		4		4	m.き.く	0.19	0.76	5224302
22	PAD	MILD STEEL SS41P		1		1	ⓜ	9.9	9.9	5224302
21	SHOULDER BEARING	CAST STEEL, WHITE METAL SC46, WJ2		1		1	き.く			5224303 外注品使用
20	WIRE (2φ X 10000)	STAINLESS STEEL SUS304-WR		1		1	ⓜ			5224302
19	RESIST. BULB	MAKER'S STANDARD MATERIAL		SET 1	SET 1	SETS 2	ⓓ			6249460 外注品使用 (GI電手配)
18	WIRE (2φ X 20000)	STAINLESS WIRE SUS304-WR		1		1				5224304 外注品使用
17	PACKING (φ1140 X φ1014 X 1t)	NON ASBESTOS TYPE V# 6071		4	4	8				〃
16	(FORE) BOLT (M24 X 75)	CARBON STEEL S45C		20		20				〃
15	(AFT) BOLT (M24 X 100) (75)	STAINLESS STEEL SUS316B		20	20	40				SPARE BOLT L=75 〃
14	(FORE) STERN TUBE SEALING	MAKER'S STANDARD MATERIAL		SET 1		SET 1				〃
13	(AFT) STERN TUBE SEALING	MAKER'S STANDARD MATERIAL		SET 1		SET 1				5224304 外注品使用
12	ANODE	ALUMINIUM		4	4	8				5224309 外注品使用
11	BOLT (M24 X 60)	MILD STEEL SS41B		20		20	ⓜ	0.34	6.8	5224302
10	PIN (φ24 X 50)	STAINLESS STEEL SUS316B		6		6	ⓜ	0.18	1.08	〃
9	CLIP	MILD STEEL SS00P		24		24	ⓜ	0.03	0.72	〃
8	GUARD RING	MILD STEEL SS41P		SET 1		SET 1	ⓜ	212	212	〃
7	OIL PASSAGE	MILD STEEL SS00P		1		1	ⓜ	1.8	1.8	〃
6	OIL PASSAGE	MILD STEEL SS00P		2		2	ⓜ	22.4	44.8	〃
5	ADAPTER BOX	MILD STEEL SS41P, STPG		SET 1		SET 1	m.き.く	159	159	5224302
4	(FORE) BEARING METAL	WHITE METAL WJ2		1		1	き.く	37	37	5224303 外注品使用
3	(FORE) BEARING BUSH	DUCTILE IRON ASTM A536 60-40-18		1		1	き.く	473	473	〃
2	(AFT) BEARING METAL	WHITE METAL WJ2		1		1	き.く	120	120	〃
1	(AFT) BEARING BUSH	DUCTILE IRON ASTM A536 60-40-18		1		1	き.く.ⓢ	1T504	1T504	5224303 外注品使用

TS1323/4/5 5124302 (1/9)

REMARKS

図面関係 DWG FOR REFERENCE

1. 軸系装置 (5124200) ARRANGEMENT OF SHAFTING
2. 推進軸 (5124203) PROPELLER SHAFT
3. 船尾骨材及船尾管 (2104201) STERN FLAME & STERN TUBE
4. 船尾管シーリング (5124304) STERN TUBE SEALING
5. 船尾管艉側シーリング用油管装置 (5124305) ARRANGEMENT OF OIL PIPE FOR AFT SEALING

検査関係 INSPECTION

1. 船級 : ABS CLASSIFICATION : ABS

工作関係 WORKMAN-SHIP

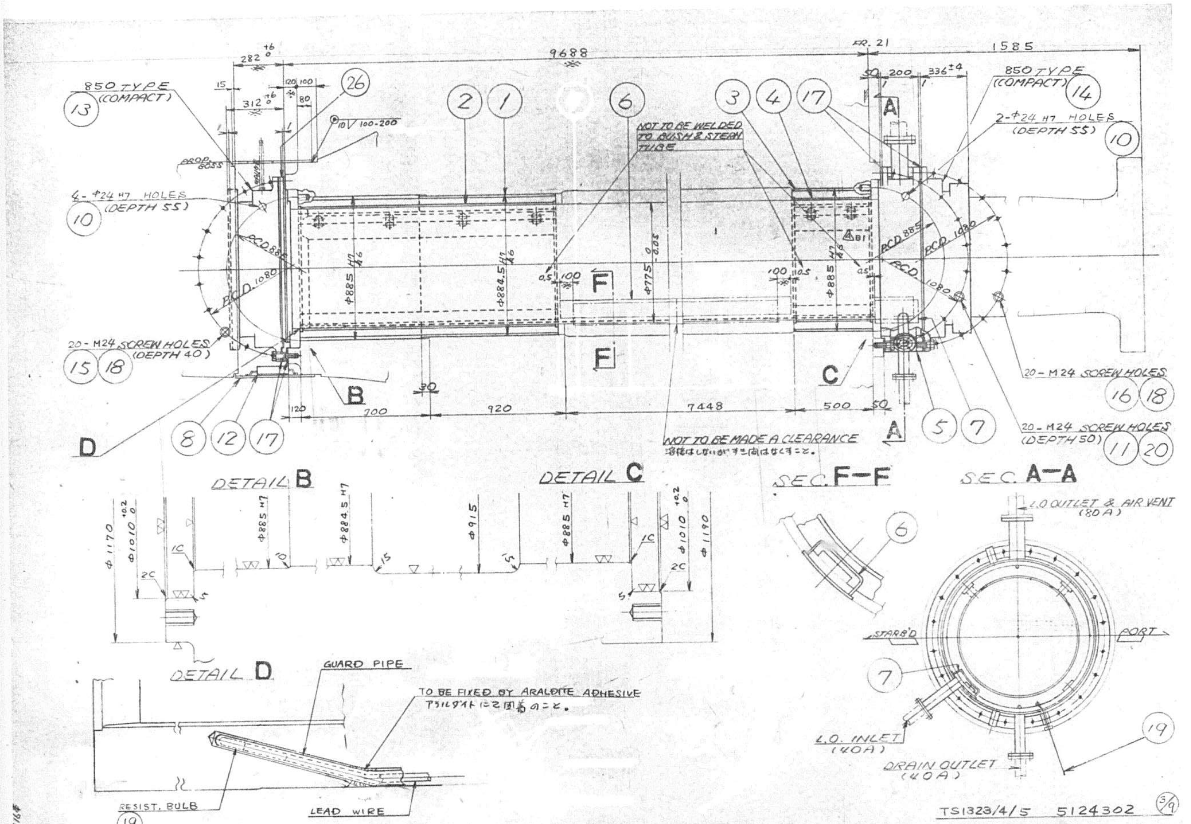
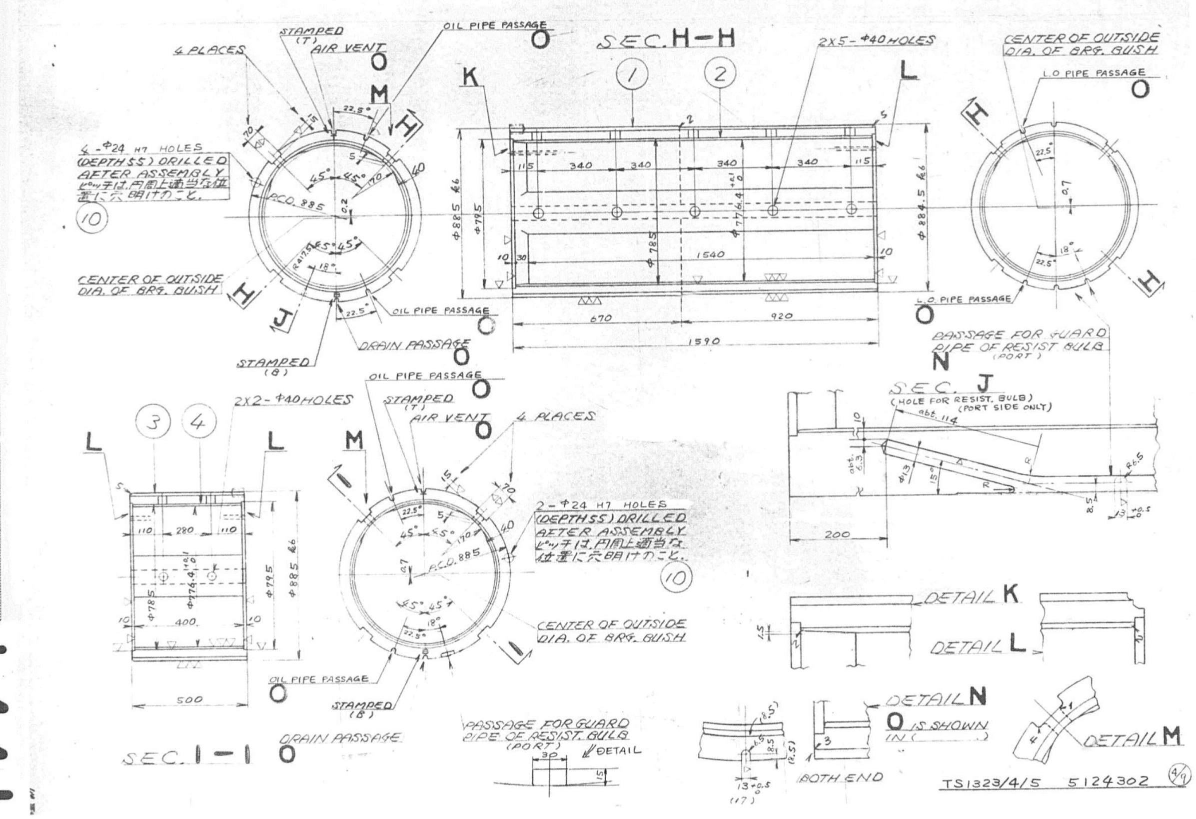
1. 符号⑧は、二つ割りとし外面のみ船体外板と同様の防錆塗装を行うこと。
   No ⑧ TO BE DIVIDED IN TWO PIECES AND OUTER SURFACE TO BE PAINTED AS HULL
2. 船尾管内潤滑油量 約1500ℓ
   L.O. QUANTITY IN STERN TUBE ONLY ABT. 1500ℓ
3. 船尾管内の部品の溶接スケールは、充分に取り除くこと。
   WELDED SCALE OF PARTS IN STERN TUBE TO BE CLEANED OFF.
4. ※印寸法は、参考迄に示す。
   ※MARKED DIMENSION IS FOR REFERENCE.
5. 船尾管軸受用の測温抵抗体は、常予備共に軸受に装着し、接続箱迄配線を行い、常備用のみ接続箱より指示計に接続するものとする。
   RESISTANCE BULBS FOR STERN TUBE BEARING (BOTH FOR WORKING & SPARE) ARE TO BE FITTED TO THE BEARING & TO BE CONNECTED TO THE JUNCTION BOX.
   THE RESISTANCE BULB ONLY FOR WORKING IS TO BE CONNECTED TO THE INDICATOR FROM THE JUNCTION BOX.

外注先関係

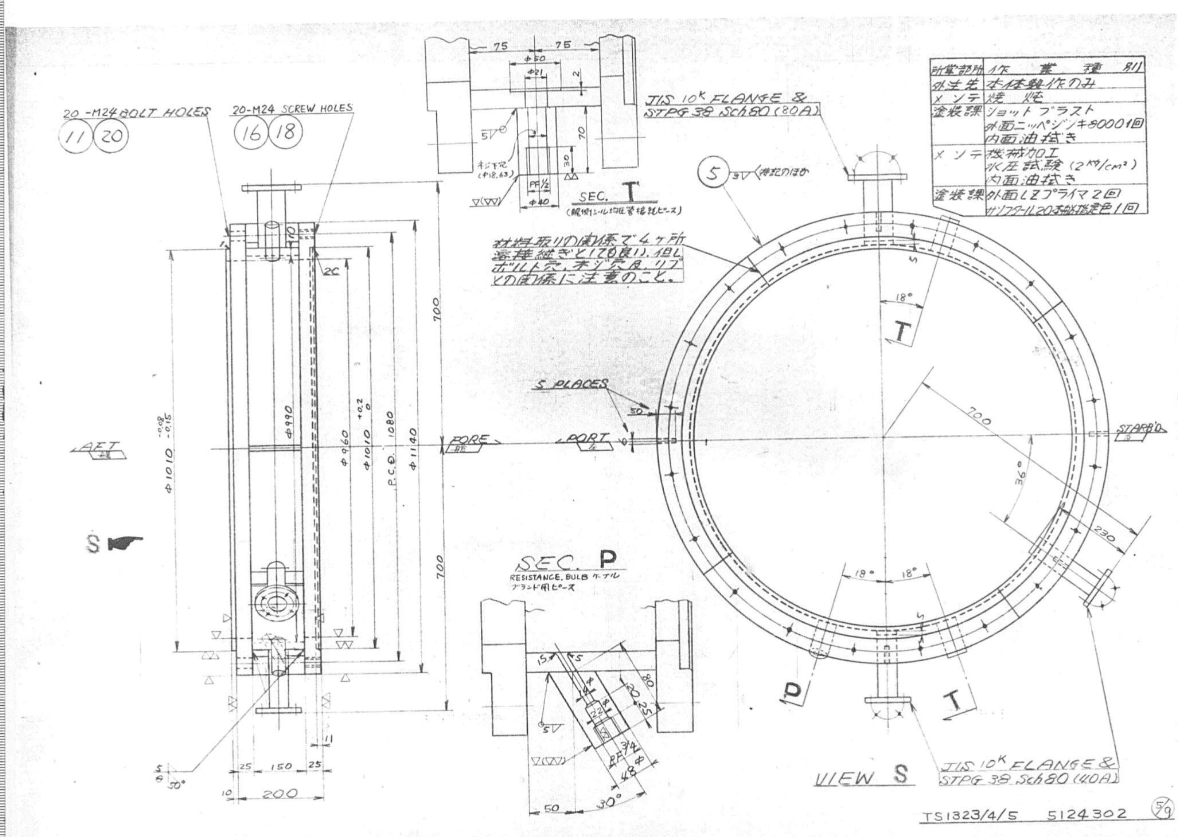
1. 符号⑧は、外注先にて符号⑫アノードを取付けて納入のこと。(アノードは三井より支給する。)

TS1323/4/5 5124302 (2/9)

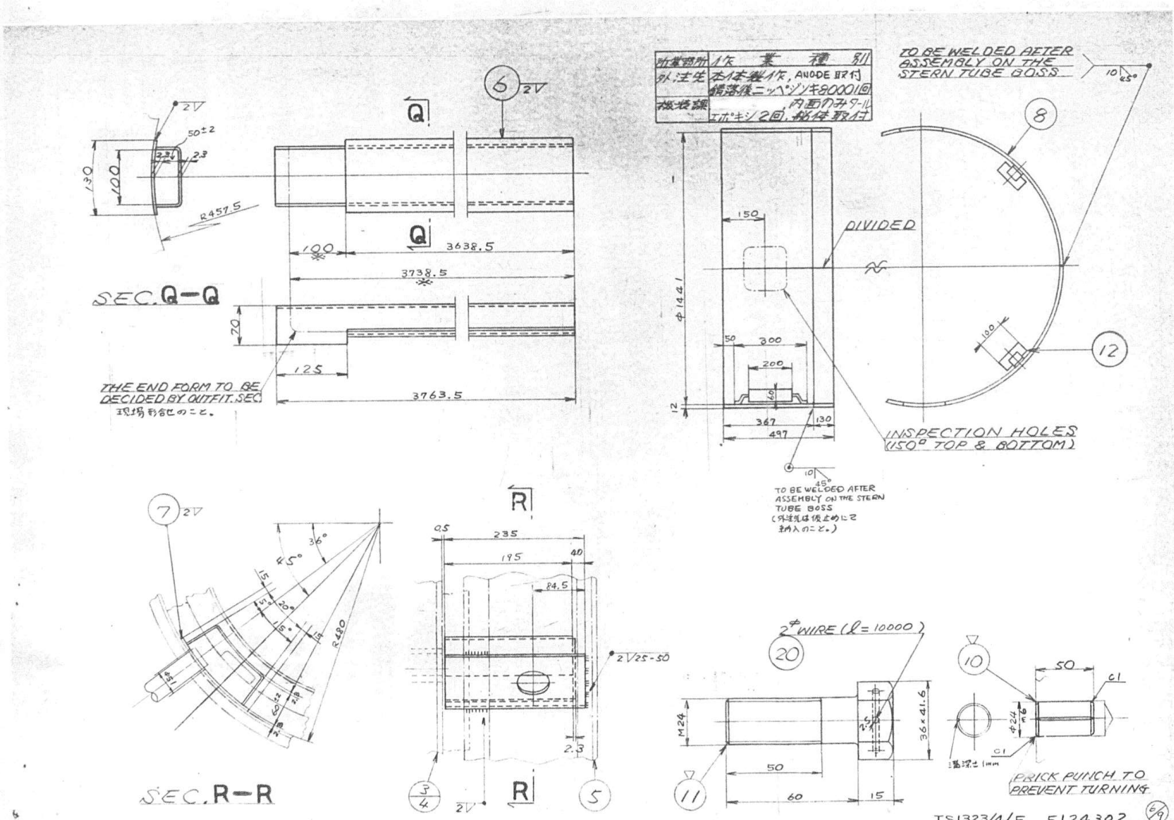
1440


9688
1585
850 TYPE (COMPACT)
4-Φ24 H7 HOLES (DEPTH 55)
20-M24 SCREW HOLES (DEPTH 40)
2-Φ24 H7 HOLES (DEPTH 55)
20-M24 SCREW HOLES
20-M24 SCREW HOLES (DEPTH 50)
NOT TO BE WELDED TO BUSH & STERN TUBE
NOT TO BE MADE A CLEARANCE
DETAIL B
DETAIL C
DETAIL D
GUARD PIPE
TO BE FIXED BY ARALDITE ADHESIVE
アラルダイトにて固着のこと。
RESIST. BULB
LEAD WIRE
SEC. F-F
SEC. A-A
L.O. OUTLET & AIR VENT (80A)
STARB'D
PORT
L.O. INLET (40A)
DRAIN OUTLET (40A)
TS1323/4/5 5124302

SEC. H-H
4 PLACES
STAMPED (T) AIR VENT
OIL PIPE PASSAGE
2X5-Φ40 HOLES
CENTER OF OUTSIDE DIA. OF BRG. BUSH
L.O PIPE PASSAGE
4-Φ24 H7 HOLES (DEPTH 55) DRILLED AFTER ASSEMBLY
ピッチは円周上適当な位置に穴明けのこと。
DRAIN PASSAGE
STAMPED (B)
PASSAGE FOR GUARD PIPE OF RESIST BULB (PORT)
SEC. J
(HOLE FOR RESIST. BULB) (PORT SIDE ONLY)
2X2-Φ40 HOLES
2-Φ24 H7 HOLES (DEPTH 55) DRILLED AFTER ASSEMBLY
DETAIL K
DETAIL L
DETAIL N
O IS SHOWN IN ( )
DETAIL M
BOTH END
SEC. I-I
TS1323/4/5 5124302

1441

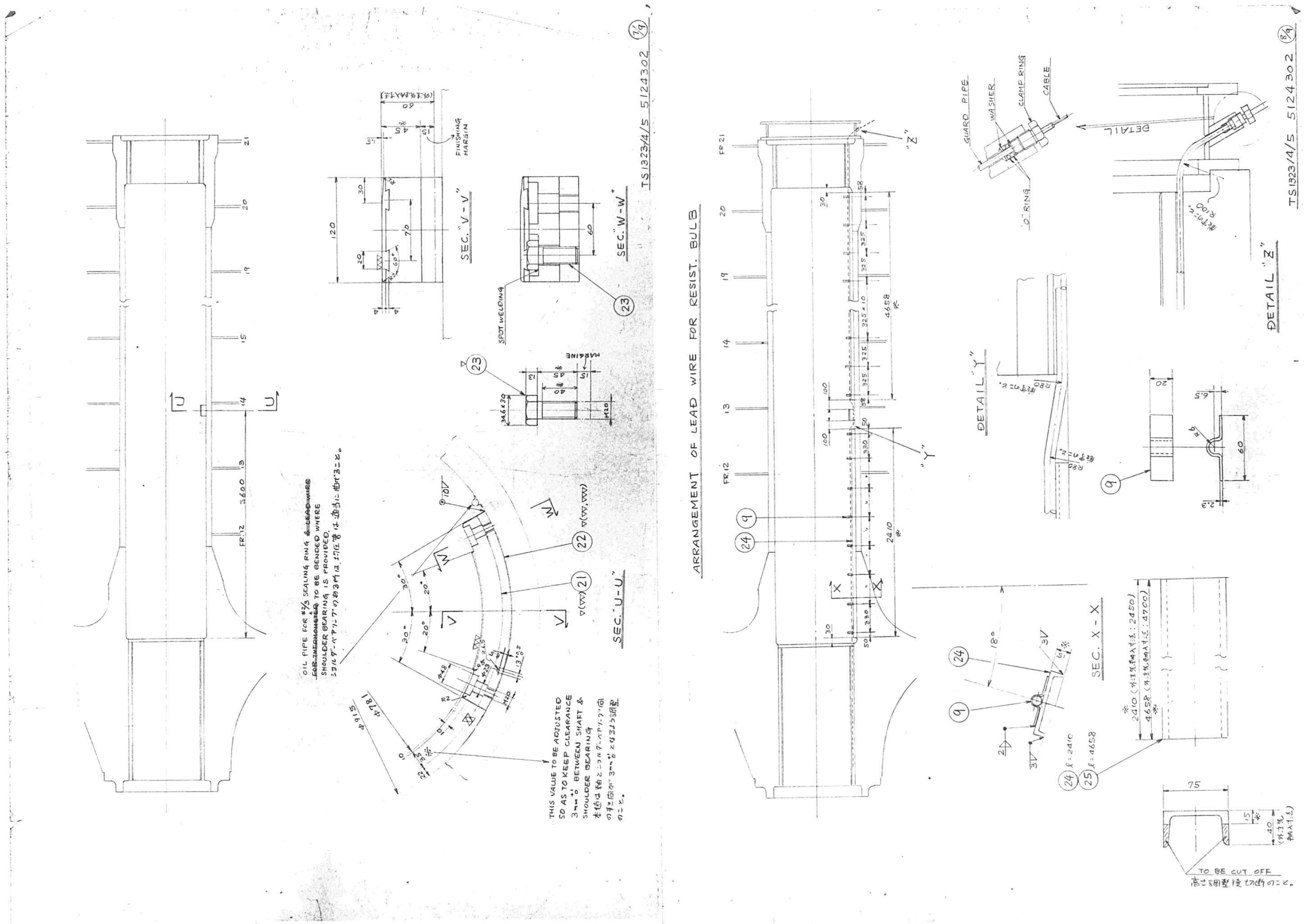


20-M24 BOLT HOLES
20-M24 SCREW HOLES
SEC. T
JIS 10K FLANGE & STPG 38 Sch80 (80A)
SEC. P
RESISTANCE, BULB
5 PLACES
AFT
FORE
PORT
STARB'D
VIEW S
JIS 10K FLANGE & STPG 38 Sch80 (40A)
TS1323/4/5 5124302



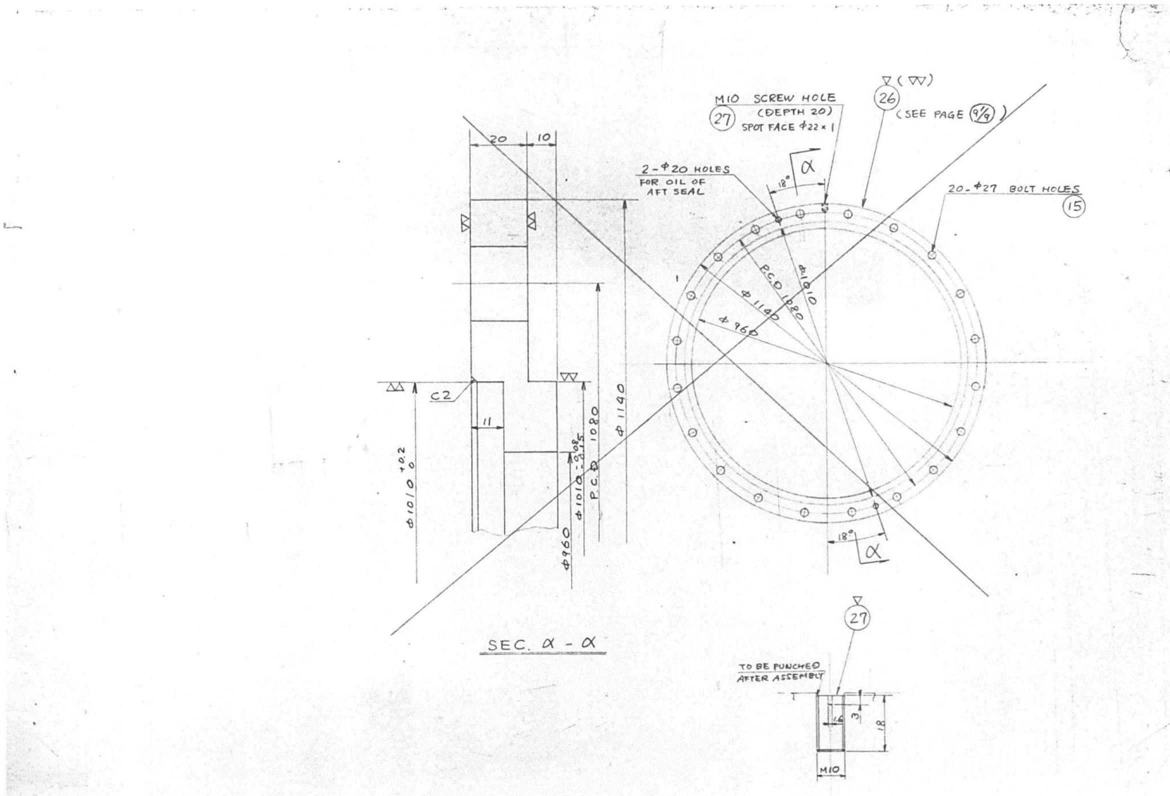
TO BE WELDED AFTER ASSEMBLY ON THE STERN TUBE BOSS
SEC. Q-Q
THE END FORM TO BE DECIDED BY OUTFIT. SEC
DIVIDED
INSPECTION HOLES (150° TOP & BOTTOM)
TO BE WELDED AFTER ASSEMBLY ON THE STERN TUBE BOSS
SEC. R-R
2# WIRE (ℓ = 10000)
PRICK PUNCH TO PREVENT TURNING
TS1323/4/5 5124302

1442

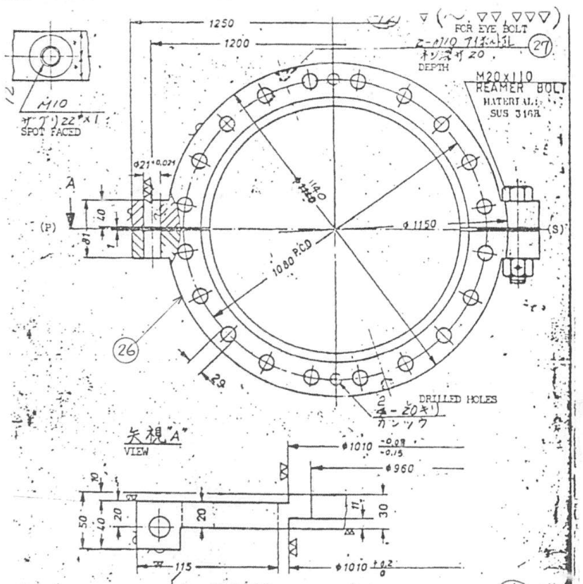


TS1323/4/5 5124302 (7/9)
SEC. "V-V"
FINISHING MARGIN
SEC. "W-W"
SPOT WELDING
SEC. "U-U"
THIS VALUE TO BE ADJUSTED SO AS TO KEEP CLEARANCE 3mm "0" BETWEEN SHAFT & SHOULDER BEARING
ARRANGEMENT OF LEAD WIRE FOR RESIST. BULB
TS1323/4/5 5124302 (8/9)
GUARD PIPE
WASHER
CLAMP RING
CABLE
"O" RING
DETAIL "Z"
DETAIL "Y"
SEC. X-X
TO BE CUT OFF

1443



TS1323/4/5 5124302 (9/9)



TS1323/4/5 5124302 (9/9)

1	DISTANCE RING	SS41P
符号 ITEM	部品名 NAME OF PART	材料 MATERIAL

名称 NAME: SIMPLEX COMPACT SEAL DISTANCE RING TYPE D-850

神戸製鋼所 設計部 KOBE STEEL, LTD. DESIGN ENGINEERING DEPT.

C-0358

4-

図面来歴記入欄		PLAN RECORD		
REV. NO.	MARK	DESCRIPTION	BY	DATE
ORIG	–	PREPARED FOR S.NO. 1158, 1159 & 1164.		
		Altered MES original drawing by MHI practice. Difference between MHI & MES	SY	Oct. 4, 1985
	△1	(1) Thickness & material of shoulder bearing (Page 7/9 & 1/9) (2) Arrange. of lead wire for resist. bulb (Page 8/9 & 1/9)		
10	△2	Added the oil hole for aft seal to distance ring according to the altered plan of MES (See Page 9/9)	H.M. SY	Dec. 19, 1985
F	–	Prepared as finished plan for S.NO. 1158 (Changed distance ring ⑧ from solid type to split type, see page 9/9)		

NO. 1158	JAMES LYKES
~~NO. 1159~~	~~JOSEPH LYKES~~
~~NO. 1164~~	~~SOLON TURMAN~~

(N.O.) OWNER 2
O.F. 2

Distribution record: Oct. 4, 1985 — 4, B, B, 1, 1, Z, 3, Z, Z, 1Z, 1, 1, Z — total 39; Rev. 10, Dec. 19, 1985 — 1, 1, 1, Z, 3, Z, Z, 1Z, 1, 1, Z — total 28

Total 12 sheets (A3 .. 8, A4 .. 4)

出図種類 A:承認 B:承認申請 C:打合用 D:工事用 E:参考 F:不承認 G:承認申請中 H:仮図 J:完成図 K:再承認申請

REQ. NO.			MAJOR PLAN / MINOR PLAN
CONFERRED	SHIP DESIGNING DEPARTMENT ENGINE OUTFIT DESIGNING SECTION	船尾管軸受 STERN TUBE BEARING	
APPROVED	[signature]		
	H. Maeukane		
CHECKED	D. Yamaguchi		
DRAWN			
SCALE			
ORDER	02-15800 ~~02-15900~~ ~~02-10400~~	ITEM 0300	DRAWING NO. GA-34302-F (MES DWG. NO. 5124302)
			LYKES REF NO. 430203

受付

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
ORIGINAL		SUBMITTED FOR APPROVAL OF OWNER / ABS / U.S.C.G. : NOTE : TO BE CHECKED BY A.B.S. ON BEHALF OF U.S.C.G.	MAR/4/'85 J. M
△A		REVISED AS FOLLOWS BECAUSE OF OUR MISTAKE.	MAR/16/'85 J. M
	△A B1	1. LIMITS & FITS BETWEEN INSIDE OF STERN TUBE & OUT SIDE OF STERN TUBE BUSH ARE ALTERED FROM H7/k7 TO H7/k6.	
	△A B2	2. TOLERANCE OF SPIGOT PART OF STERN TUBE ARE ALTERED FROM $\phi 1010^{-0.08}_{-0.18}$ TO $\phi 1010^{+0.2}_{0}$.	
	△A B3	3. TOLERANCE OF SPIGOT PART OF ADAPTER BOX ARE ADDED.	
	△A B4	4. TOLERANCE OF FACE TO FACE BETWEEN AFT END OF PROP. & FORE END OF STERN FRAME ARE ALTERED IN ACCORDANCE WITH S/T SEAL MAKER'S STANDARD.	
	△B 01	1. DISTANCE RING ARE PROVIDED BETWEEN AFT SEAL & STERN FRAME	AUG/29/'85 J. M
	△B B1	2. RESIST. BULB IS ALTERED TO REMOVAL TYPE.	

DWG. NO. 5124302 (i)

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL								

SHIPYARD AND SHIP'S NO. & NAME			
~~MITSUI TAMANO~~		MITSUBISHI KOBE	
~~NO. 1323~~	~~DOCTOR LYKES~~	NO. 1158	JAMES LYKES
~~NO. 1324~~	~~ALMERIA LYKES~~	~~NO. 1159~~	~~JOSEPH LYKES~~
~~NO. 1325~~	~~TILLIE LYKES~~	~~NO. 1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER	SHIP'S NO. / SHIP'S NAME
OUTFITTING DESIGN SECTION SEC. CHIEF	S. Nishiura
ASSIST. CHIEF	M. Saki
CHARGE ENG'R	J. Morimoto
STAFF	
DATE	(TEL 2235)
JOB NO. TS1323/24/25	SCALE
JOBCLASSIF. NO. E-04-01	

船尾管軸受
STERN TUBE BEARING

LYKES REF. NO. 430203
MITSUI DRAWING NO. 5124302-B

(11 SHEETS WITH COVER)

MHI 1 (EO); O.F. 2; OWNER (N.O) 2; OWNER (USA) 1; A.B.S. (N.O) 8 ... 26

ORDER LIST

本表の製造個数は1隻分を示す。 QUANTITY PER SHIP IS GIVEN IN THIS TABLE

3隻分製造のこと。 MAKE FOR THREE SHIPS.

番号 NO.	名称 NAME	材料 MATERIAL	試験片 TEST PIECE	常備 USE	予備 SPARE	合計 TOTAL	関係工場 WORK SHOP	1個 ONE 重量 WEIGHT (KG)	合計 TOTAL 重量 WEIGHT (KG)	記事 REMARKS	
27	PLUG	NABAL BRASS C4622B		1		1	ⓜ			5224302	機関課手配
26	DISTANCE RING	MILD STEEL SS41P		1		1	ⓜ	46.6	46.6	5224302	
~~25~~	~~SUPPORTER~~	~~MILD STEEL SS41~~		~~1~~		~~1~~	~~m.き.く~~			~~5224302~~	
~~24~~	~~SUPPORTER~~	~~MILD STEEL SS41~~		~~1~~		~~1~~	~~m.き.く~~			~~〃~~	
23	BOLT	MILD STEEL SS41B		4		4	m.き.く	0.19	0.76	5224302	機関課手配
22	PAD	MILD STEEL SS41P		1		1	ⓜ	9.9	9.9	5224302	設設手配
21	SHOULDER BEARING	MILD STEEL, WHITE METAL SS41, WJ2 ⚠		1		1	き.く			5224303 外注品使用	機関課手配
20	WIRE (2φ X 10000)	STAINLESS STEEL SUS304-WR		1		1	ⓜ			5224302	
19	RESIST. BULB	MAKER'S STANDARD MATERIAL		SET 1	SET 1	SETS 2	ⓣ			6247460 外注品使用	電装設手配
18	WIRE (2φ X 20000)	STAINLESS WIRE SUS304-WR		1		1				5224304 外注品使用	設計外注
17	PACKING (φ1140 X φ1014 X 1t)	NON ASBESTOS TYPE V# 1071		4	4	8				〃	
16	(FORE) BOLT (M24 X 75)	CARBON STEEL S45C		20		20				〃	
15	(AFT) BOLT (M24 X 100) (75)	STAINLESS STEEL SUS316B		20	20	40				SPARE BOLT L=75 〃	
14	(FORE) STERN TUBE SEALING	MAKER'S STANDARD MATERIAL		SET 1		SET 1				〃	
13	(AFT) STERN TUBE SEALING	MAKER'S STANDARD MATERIAL		SET 1		SET 1				5224304 外注品使用	
12	ANODE	ALUMINIUM		4	4	8				5224309 外注品使用	
11	BOLT (M24 X 60)	MILD STEEL SS41B		20		20	ⓜ	0.34	6.8	5224302	機関課手配
10	PIN (φ24 X 50)	STAINLESS STEEL SUS316B		6		6	ⓜ	0.18	1.08	〃	
9	CLIP	MILD STEEL SS00P		24		24	ⓜ	0.03	0.72	〃	生技課手配
8	GUARD RING	MILD STEEL SS41P		SET 1		SET 1	ⓜ	212	212	〃	
7	OIL PASSAGE	MILD STEEL SS00P		1		1	ⓜ	1.8	1.[illegible]	〃	
6	OIL PASSAGE	MILD STEEL SS00P		2		2	ⓜ	22.4	44.8	〃	
5	ADAPTER BOX	MILD STEEL SS41P, STPG		SET 1		SET 1	m.き.く	159	159	5224302	機関課手配
4	(FORE) BEARING METAL	WHITE METAL WJ2		1		1	き.く	37	37	5224303 外注品使用	船殻設計外注
3	(FORE) BEARING BUSH	DUCTILE IRON ASTM A536 60-40-18		1		1	き.く	473	473	〃	
2	(AFT) BEARING METAL	WHITE METAL WJ2		1		1	き.く	120	120	〃	
1	(AFT) BEARING BUSH	DUCTILE IRON ASTM A536 60-40-18		1		1	き.く ⓢ	1T504	1T504	5224303 外注品使用	

TS1323/4/5 5124302 (1/9)

REMARKS

図面関係 DWG FOR REFERENCE

1. 軸系装置 (5124200) ARRANGEMENT OF SHAFTING
2. 推進軸 (5124203) PROPELLER SHAFT
3. 船尾骨材及船尾管 (2104201) STERN FLAME & STERN TUBE
4. 船尾管シーリング (5124304) STERN TUBE SEALING
5. 船尾管艉側シーリング用油管装置 (5124305) ARRANGEMENT OF OIL PIPE FOR AFT SEALING

検査関係 INSPECTION

1. 船級 : ABS CLASSIFICATION : ABS

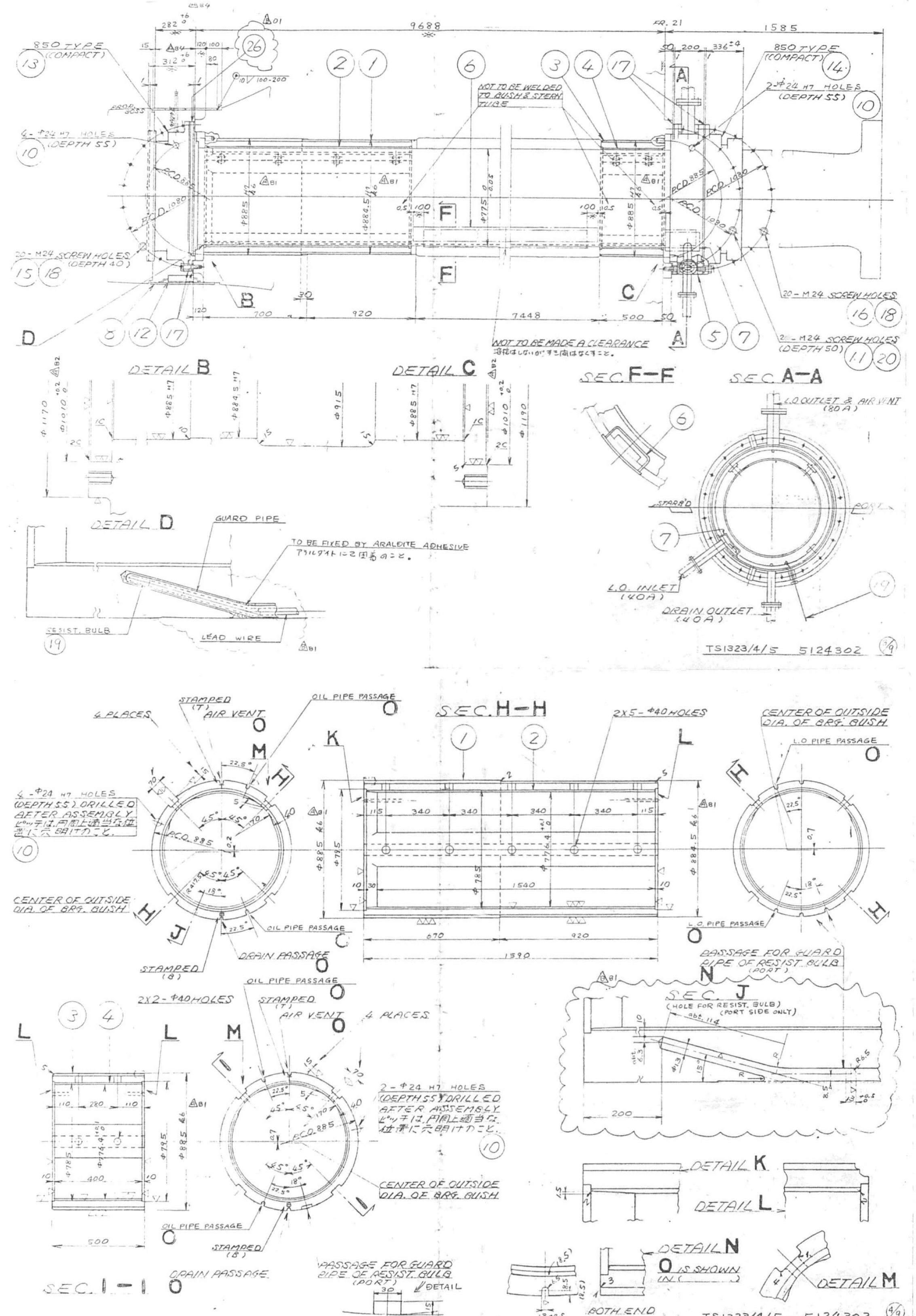
工作関係 WORKMAN-SHIP

1. 符号⑧は、二つ割りとし外面のみ船体外板と同様の防錆塗装を行うこと。 № ⑧ TO BE DIVIDED IN TWO PIECES AND OUTER SURFACE TO BE PAINTED AS HULL
2. 船尾管内潤滑油量 約1500ℓ L.O. QUANTITY IN STERN TUBE ONLY ABT. 1500ℓ
3. 船尾管内の部品の溶接スケールは、充分に取り除くこと。 WELDED SCALE OF PARTS IN STERN TUBE TO BE CLEANED OFF.
4. ※印寸法は、参考迄に示す。 ※MARKED DIMENSION IS FOR REFERENCE.
5. ~~船尾管軸受用の測温抵抗体は、常予備共に軸受に装着し、接続箱迄配線を行い、常備用のみ接続箱より指示計に接続するものとする。 RESISTANCE BULBS FOR STERN TUBE BEARING (BOTH FOR WORKING & SPARE) ARE TO BE FITTED TO THE BEARING & TO BE CONNECTED TO THE JUNCTION BOX. THE RESISTANCE BULB ONLY FOR WORKING IS TO BE CONNECTED TO THE INDICATOR FROM THE JUNCTION BOX.~~

~~外注先関係~~

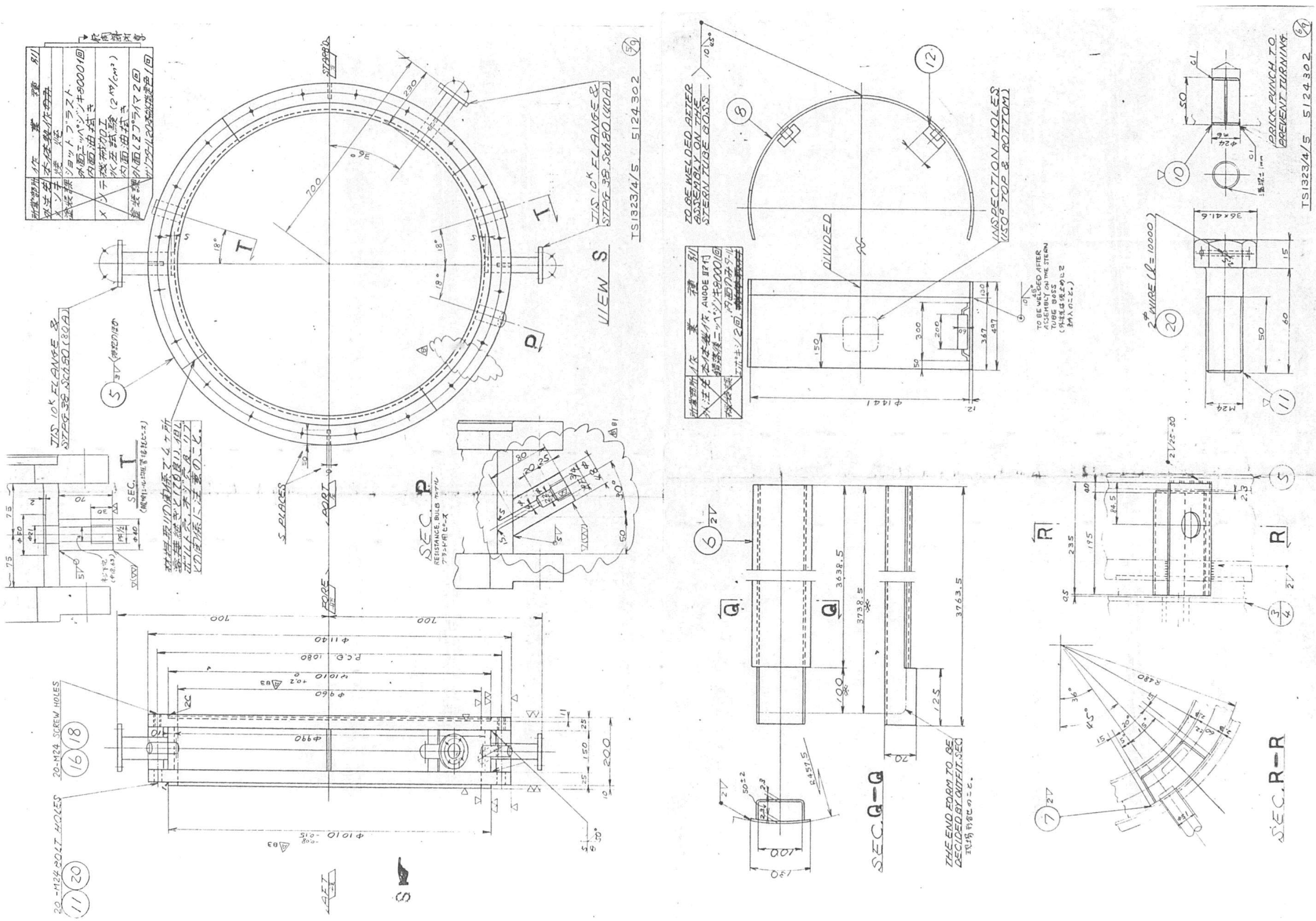
~~1. 符号⑧は、外注先にて符号⑫アノードを取付けて納入のこと。(アノードはこれより支給する。)~~

TS1323/4/5 5124302 (2/9)

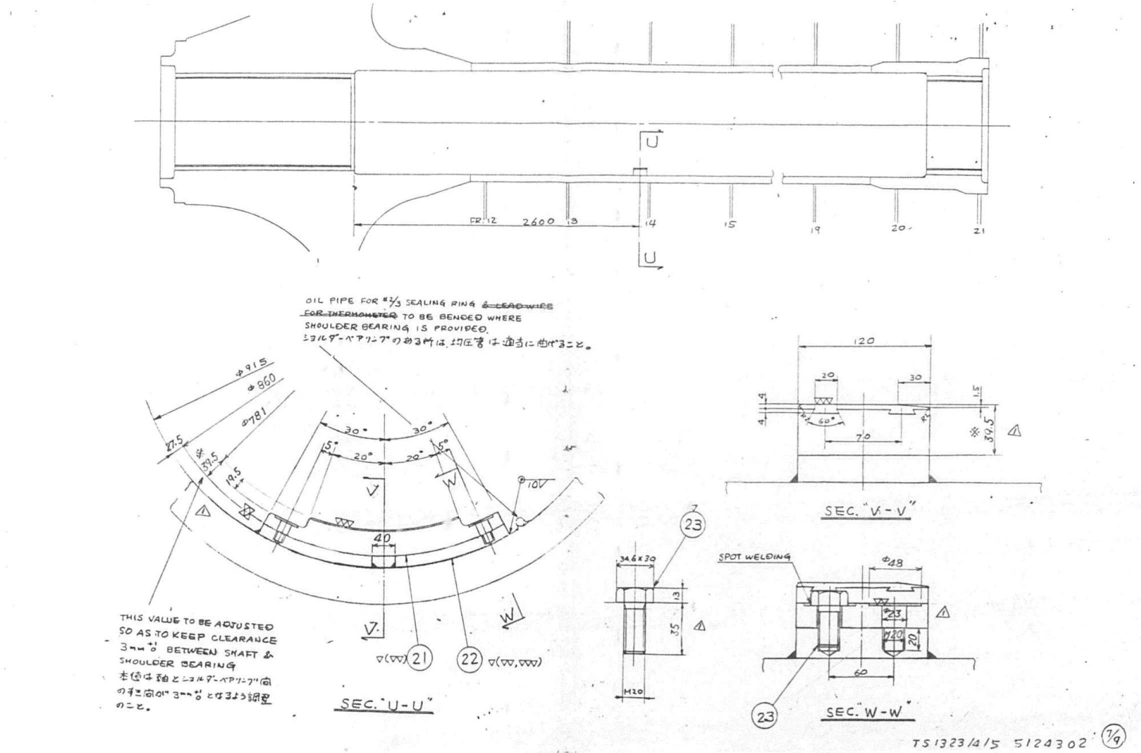


9688
1585
FR. 21
850 TYPE (COMPACT)
4-Φ24 H7 HOLES (DEPTH 55)
2-Φ24 H7 HOLES (DEPTH 55)
20-M24 SCREW HOLES (DEPTH 40)
20-M24 SCREW HOLES
2-M24 SCREW HOLES (DEPTH 50)
NOT TO BE WELDED TO BUSH & STERN TUBE
NOT TO BE MADE A CLEARANCE
7448
920
700
500
P.C.D. 885
P.C.D. 1080
DETAIL B
DETAIL C
DETAIL D
GUARD PIPE
TO BE FIXED BY ARALDITE ADHESIVE
アラルダイトにて固着のこと。
RESIST. BULB
LEAD WIRE
SEC. F-F
SEC. A-A
L.O. OUTLET & AIR VENT (80A)
L.O. INLET (40A)
DRAIN OUTLET (40A)
STARB'D
PORT
TS1323/4/5 5124302
SEC. H-H
4 PLACES
STAMPED (T) AIR VENT
OIL PIPE PASSAGE
2x5-Φ40 HOLES
CENTER OF OUTSIDE DIA. OF BRG. BUSH
L.O PIPE PASSAGE
4-Φ24 H7 HOLES (DEPTH 55) DRILLED AFTER ASSEMBLY
ピッチは、円周上適当な位置に穴明けのこと。
STAMPED (B)
DRAIN PASSAGE
1540
1590
670
PASSAGE FOR GUARD PIPE OF RESIST. BULB (PORT)
SEC. J
(HOLE FOR RESIST. BULB) (PORT SIDE ONLY)
2x2-Φ40 HOLES
2-Φ24 H7 HOLES (DEPTH 55) DRILLED AFTER ASSEMBLY
DETAIL K
DETAIL L
DETAIL N
O IS SHOWN IN
DETAIL M
BOTH END
SEC. I-I
TS1323/4/5 5124302

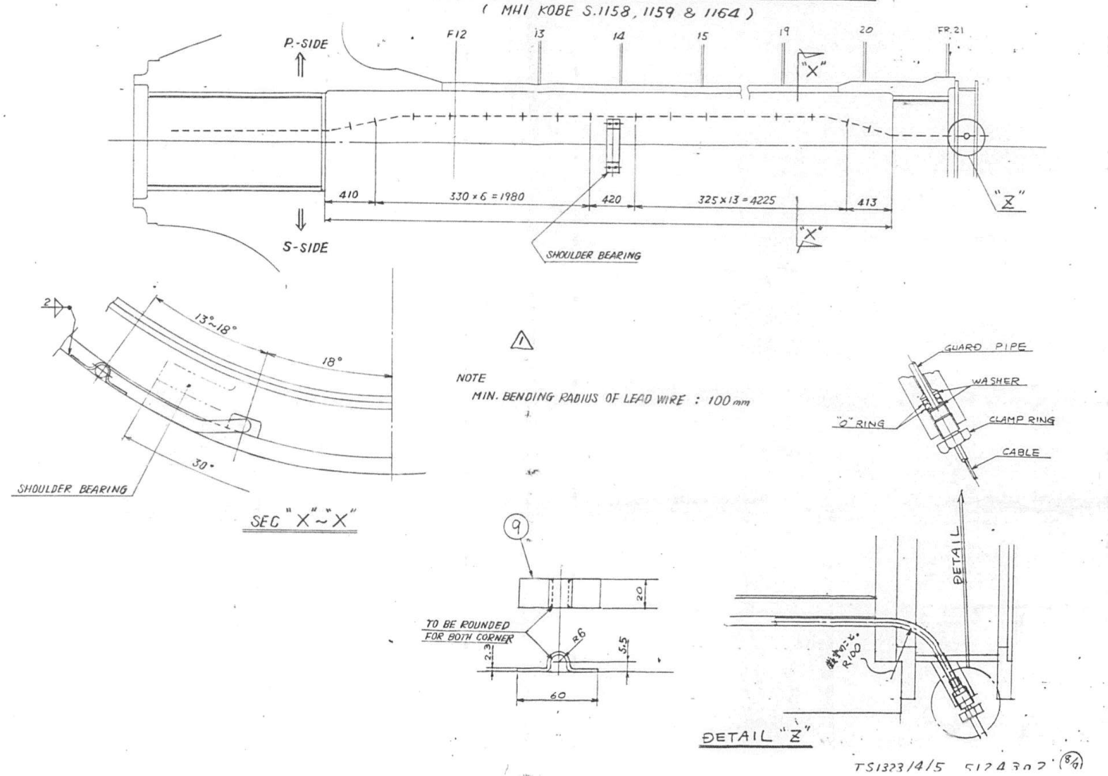
1447


VIEW S
SEC. P
SEC. Q-Q
SEC. R-R
SEC. T
TS1323/4/5 5124302
JIS 10K FLANGE
TO BE WELDED AFTER ASSEMBLY ON THE STERN TUBE BOSS
INSPECTION HOLES (150° TOP & BOTTOM)
DIVIDED
PRICK PUNCH TO PREVENT TURNING
THE END FORM TO BE DECIDED BY OUTFIT. SEC
20-M24 BOLT HOLES
20-M24 SCREW HOLES
5 PLACES
PORT
STBD
FORE
AFT

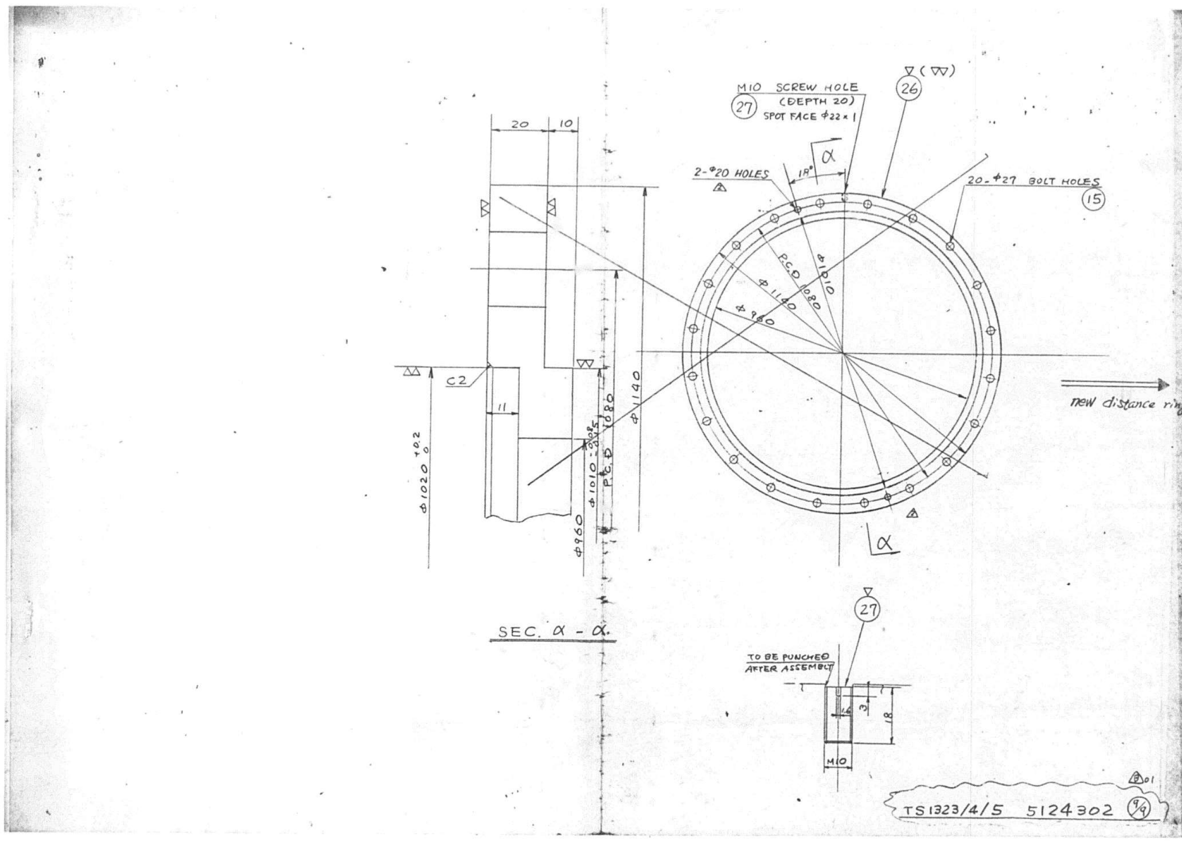
1448

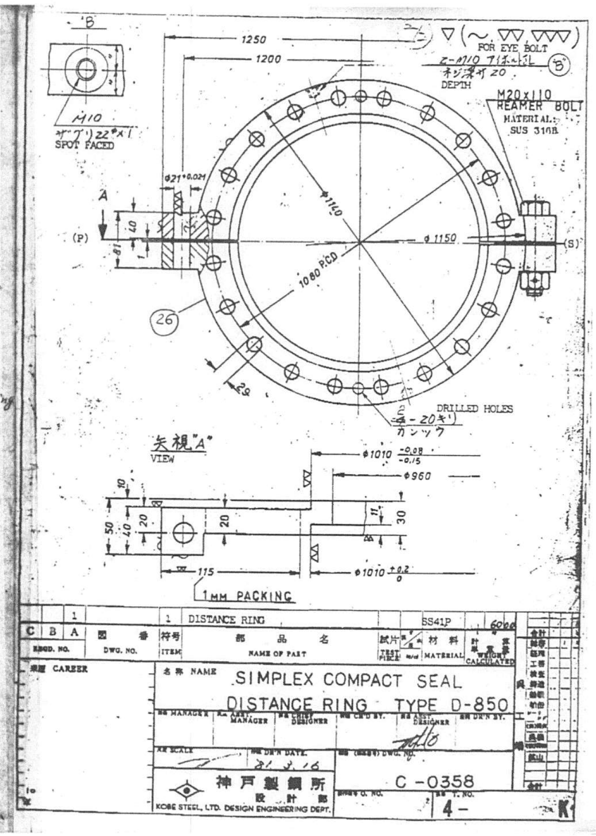


ARRANGEMENT OF LEAD WIRE FOR RESIST. BULB
(MHI KOBE S.1158, 1159 & 1164)



1449


M10 SCREW HOLE
(DEPTH 20)
SPOT FACE φ22×1
2-φ20 HOLES
20-φ27 BOLT HOLES
SEC. α - α
new distance ring
TO BE PUNCHED AFTER ASSEMBLY
TS1323/4/5 5124302


FOR EYE BOLT
M20×110
REAMER BOLT
MATERIAL: SUS 316B
M10
SPOT FACED
1080 P.C.D
DRILLED HOLES
矢視"A"
VIEW
1MM PACKING
DISTANCE RING
SS41P
SIMPLEX COMPACT SEAL
DISTANCE RING TYPE D-850
C-0358
神戸製鋼所 設計部
KOBE STEEL, LTD. DESIGN ENGINEERING DEPT.

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	Feb.14,'85	OFTS/MES/089			Mar.1,'85	File Ref: T-8-2		
1ST REV	26 APR '86	OFTS/MES-391			2 JUN '86	T-8-2		
1ST PART REV	7 JUN '86	OFTS/MES-424			2 JUN '86	T-8-2		
2ND PART REV	4 NOV '86	TAM/100			17 NOV '86	T-8-2		
3RD PART REV	27 MAR '86	TAM/160			2 APR '86	T-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT
MANAGER
STRUCTURE DESIGN SEC.
SHIP'S NO. 1325
SHIP'S NAME TILLIE LYKES

船尾骨枝及船尾管
STERN FRAME & STERN TUBE

DATE (TEL 2230)
JOB NO. TS1323/24/25
SCALE 1/50 1/25
JOBCLASSIF.NO. B04
LYKES REF. NO. 430301
MITSUI DRAWING NO. 2104201

(24 SHEETS WITH COVER)

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		"PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325"	NOV.28.'86

DWG.NO. 2104201 – 1/

PRINCIPAL PARTICULARS

LENGTH (P.P.)	(L_{PP})	245.00 M	
	(L_{SCANT})	241.627 M	
BREADTH (MLD)	(B)	32.20 M	
DEPTH (MLD)	(D)	18.80 M	
DRAFT (MLD)	(d)	11.88 M	
TOTAL RUDDER AREA (WITH HORN)	(A')	65.96 M	
TOTAL RUDDER AREA (WITHOUT HORN)	(A)	54.16 M	
RUDDER AREA (FWD OF TURNING AXIS)	(A_f)	13.59 M	
RUDDER AREA (AFT OF TURNING AXIS)	(A_a)	40.57 M	
RUDDER AREA RATIO	($A'/L_{pp}\cdot d$)	1/44.13	
BALANCING RATIO	(A_f/A)	0.251	
ASPECT RATIO	(h/ℓ)	ABT. 1.426	
RUDDER DESIGN SPEED (FULL LOAD AT MCR)		22.8 KT	
WORKING ANGLE OF RUDDER (MAX.)		35	

MATERIAL LIST

	ITEM	MATERIAL	NO	WT (TON) (ABT)
1	RUDDER HORN	(STEEL CASTING) SC42 (MAX CARBON 0.20%)	1	63.5
2	BOSS	(STEEL CASTING) SC42 (MAX CARBON 0.20%)	1	42.5
3	STERN TUBE (PLATE)	ABS STEEL	1	9.2
4	STERN TUBE	(STEEL CASTING) SC42 (MAX CARBON 0.20%)	1	3.1
5	HULL CONSTRUCTION	ABS STEEL	1	108
6	150φ EDGE BAR	(FORGED STEEL) SF45 (MAX CARBON 0.23%)	1	0.5
7	(FOR UPP. GUD.) BEARING BUSH	(STARLITE 11630) PHENOL RESIN	1	
8	(FOR UPP. GUD.) BUSH STOP RING	SS41	1	
9	(FOR UPP. GUD.) BUSH STOP RING	SS41	1	
10	(FOR LOW. GUD.) BEARING BUSH	(STARLITE 11630) PHENOL RESIN	1	
11	(FOR LOW. GUD.) BUSH STOP RING	SS41	1	
12	(FOR LOW. GUD.) BUSH STOP RING	SS41	1	
13	DRAIN FLANGE	ABS STEEL	4	
14	DRAIN PLUG	(STAINLESS STEEL) SUS 304	4	
15	PACKING (FOR PLUG)	SYNTHETIC RUBBER (NEOPRENE SHORE HARDNESS 60)	4	
16	(FOR UPP.) BUSH SECURING STOPPER	(STAINLESS STEEL) SUS 304	1	
17	(FOR LOW. GUD.) ROLLING STOPPER	SS41	2	

TOTAL WEIGHT ABT. 226.8 TON

NOTE:

1 ABS CERTIFICATION TO BE REQUIRED FOR ◎ ITEMS.

2 APPROVED LOW-HYDROGEN ELECTRODES TO BE USED FOR INITIAL SEVERAL BEADS OF FABRICATION AND PRODUCTION WELDS.

3 IN CASE OF WELDING OF CASTING AND HEAVY PLATING (CAST TO STEEL & CAST TO CAST) WELDING JOINT TO BE SUITABLY PRE-HEATED PRIOR TO WELDING AND LOW-HYDROGEN ELECTRODES TO BE USED.

4 VOID SPACES TO BE TESTED BY THE COMPRESSED AIR. (PRESSURE 0.5KG/CM²).

5 CASTING & FORGING TO BE INSPECTED WITH MAGNAFLUX OR ULTRASONIC.

6 ALL CASTING TO BE ANNEALED BUT FABRICATED BLOCKS TO BE AS WELD.

7 FOR COATING OF INTERIOR SURFACES, SEE "PAINTING SCHEDULE" (DWG.NO 3101001)

8 COOLING TANK TO BE TESTED BY HYDRAULIC PRESSURE.

9 FINAL BORING OF THE STERN TUBE & BOSS AND GUDGEONS TO BE ACCOMPLISHED AFTER WELDING OF STERN STRUCTURE COMPLETED. AND TANKS HYDROSTATICALLY TESTED.

10 GRADE OF PLATES TO BE AS FOLLOWS.

$t \leq 12.5$ --- AAM (GRADE "A" RIMMED)

$t = 16, 20, 30$ --- AAS (GRADE "A" SEMI-KILLED)

$t = 40$ --- ABS (GRADE "B" SEMI-KILLED)

$t = 45, 50, 65$ --- ADN (GRADE "D" KILLED & NORMALIZED)

(NOTE FOR DRAWINGS)

11 BOTH SIDES TO BE SYMMETRICAL EXCEPT SPECIFIED.

12 TRANS. SECTIONS TO BE "LOOKING FORE".

13 MACHINING MARK & SURFACE ROUGHNESS:

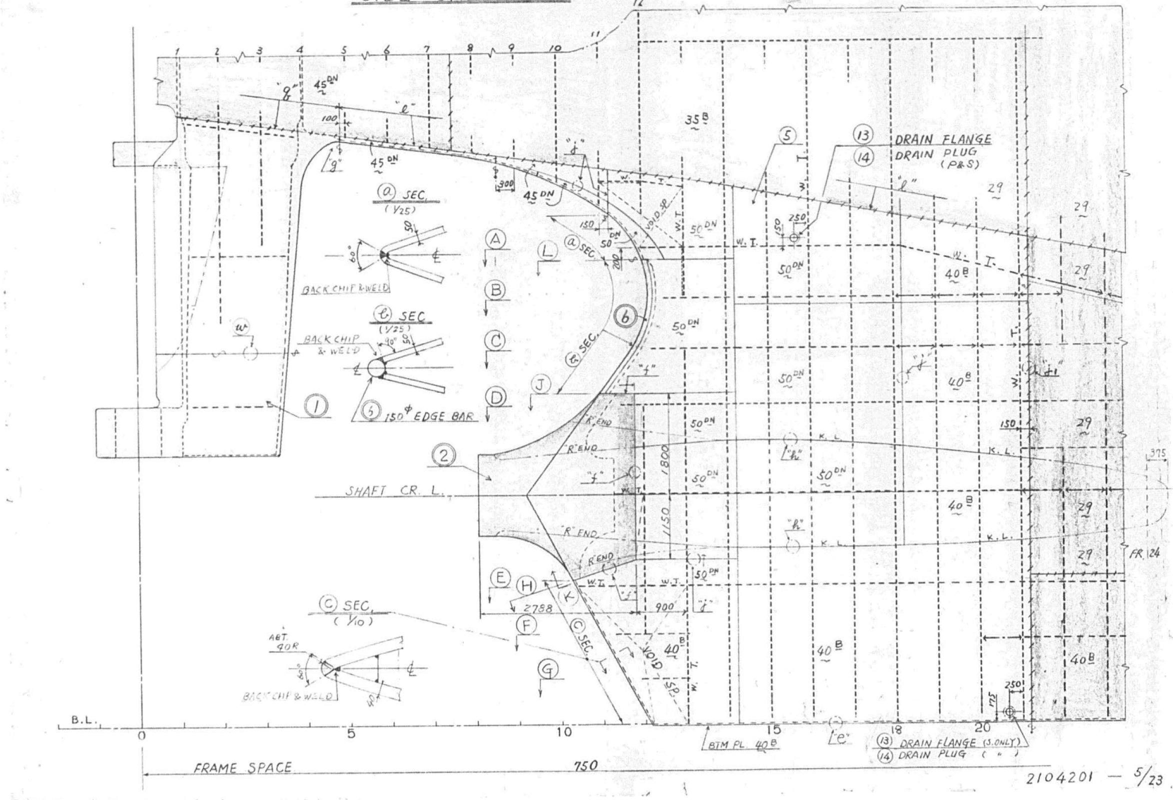
UNIT μ(MICRON)

MACHINING MARK & SURFACE ROUGHNESS:					
MACHINING MARK		▽▽▽	▽▽	▽	~
	DIA.(MM)				
ROUND SURFACE	0- 20	1.6-S	12-S	35-S	
	21- 200	3.0-S	12-S	35-S	
	201- 500	3.0-S	12-S	50-S	
	501- 750	6.0-S	18-S	100-S	
	751-1000	6.0-S	25-S	200-S	
FLAT SURFACE		6.0-S	12-S	35-S	

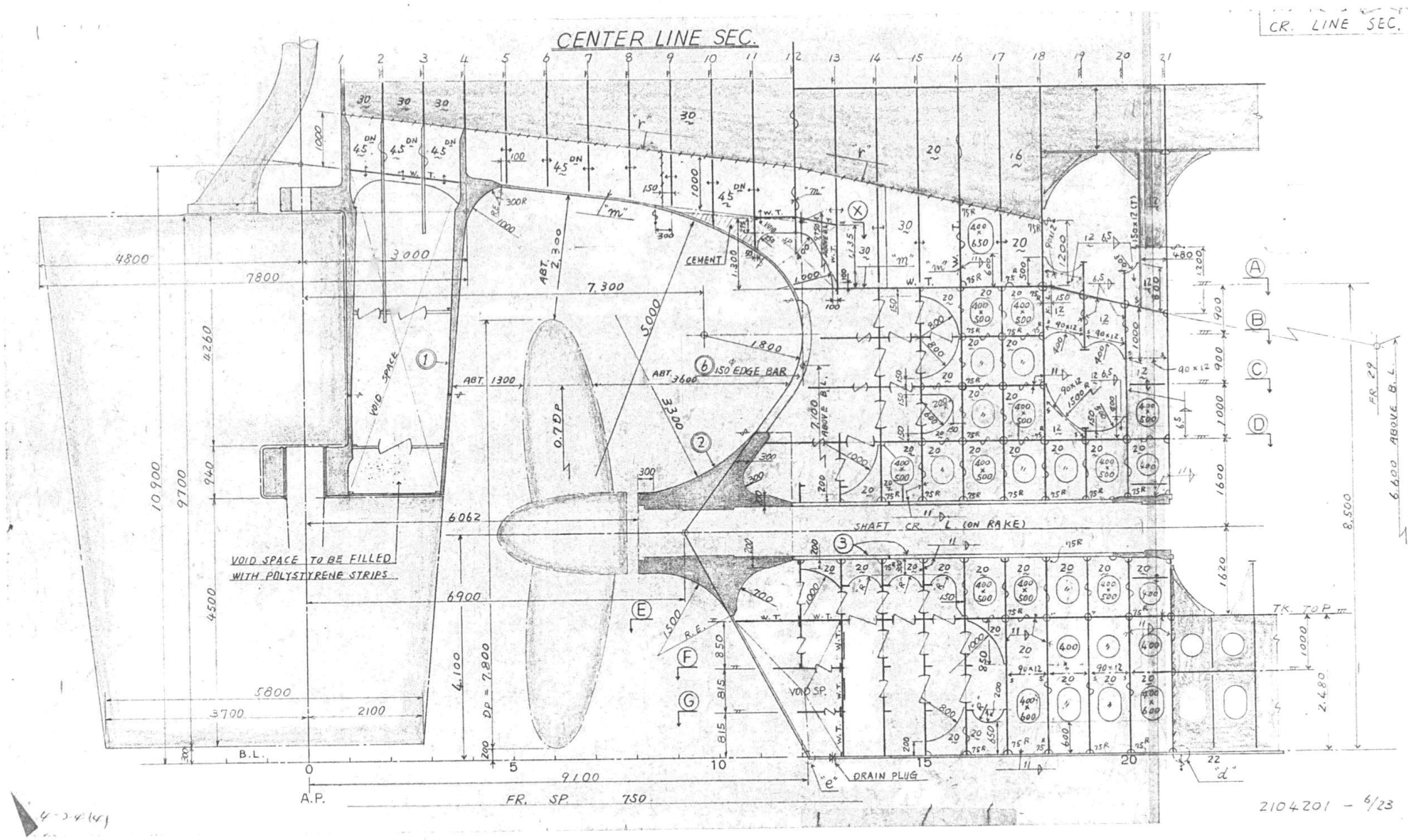
IN CASE THAT THE SURFACE ROUGHNESS GRADE IS DIFFERENT FROM THE ABOVE, THE MACHINING MARK TO BE ACCOMPANIED BY THE SPECIFIED SUFACE ROUGHNESS.

2104201 - 4/23

SIDE SHELL (1/50)

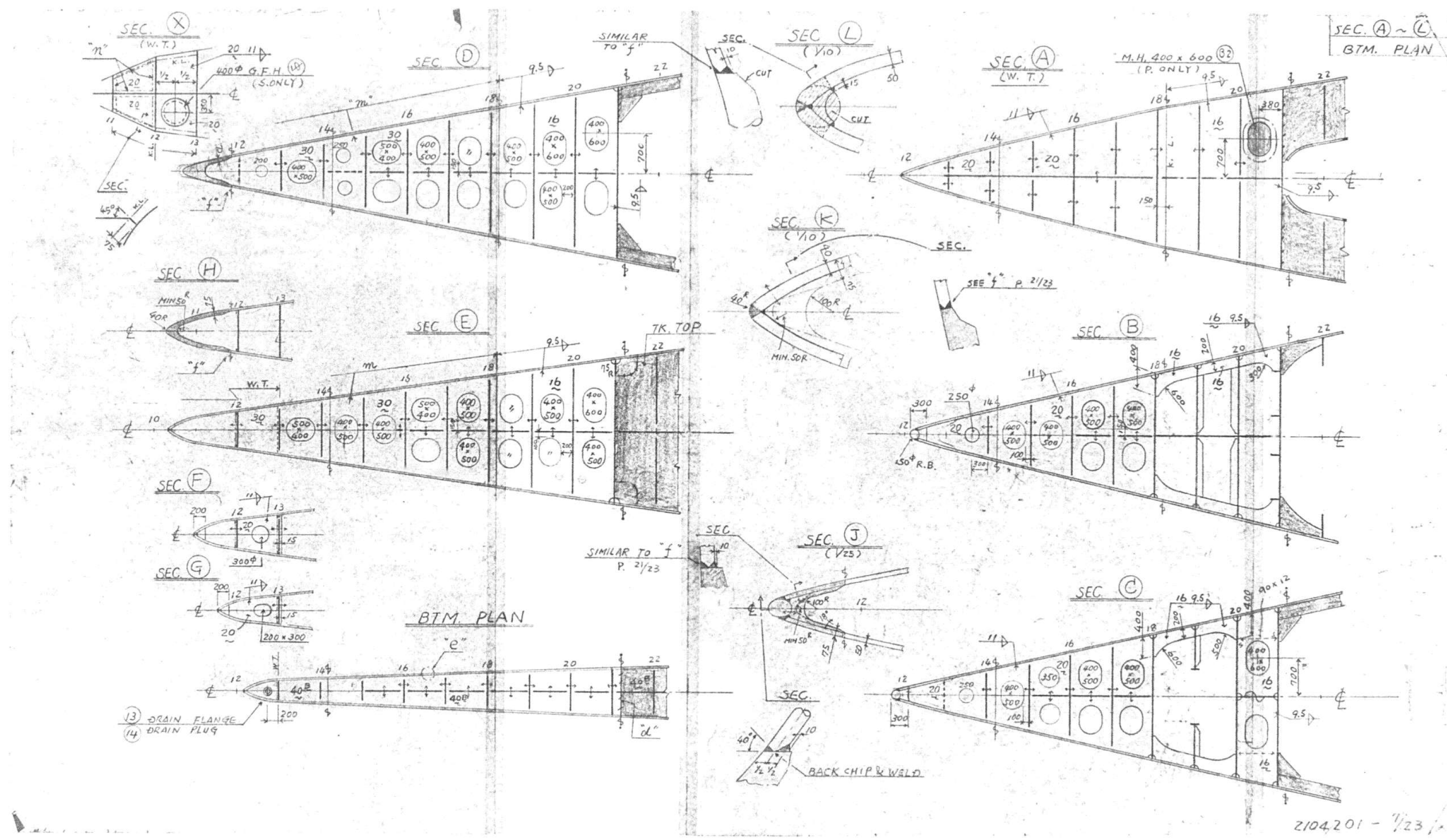


2104201 — 5/23



CENTER LINE SEC.
CR. LINE SEC.
VOID SPACE TO BE FILLED
WITH POLYSTYRENE STRIPS
SHAFT CR. L (ON RAKE)
DRAIN PLUG
A.P.
FR. SP. 750
2104201 - 6/23

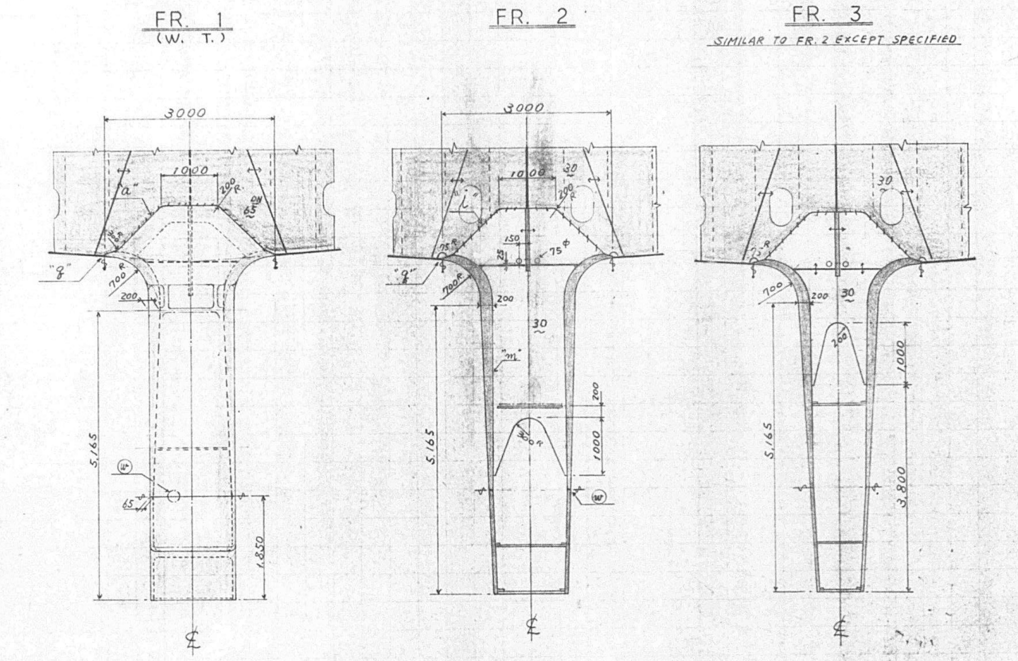
1453



SEC. X
SEC. D
SEC. L
SEC. A
SEC. A ~ L
BTM. PLAN
M.H. 400 x 600
(P. ONLY)
SEC. H
SEC. E
TK. TOP
SEC. K
SEC. B
SEC. F
SEC. G
SIMILAR TO "f"
SEC. J
SEC. C
BTM. PLAN
13 DRAIN FLANGE
14 DRAIN PLUG
BACK CHIP & WELD
2104201 - 7/23

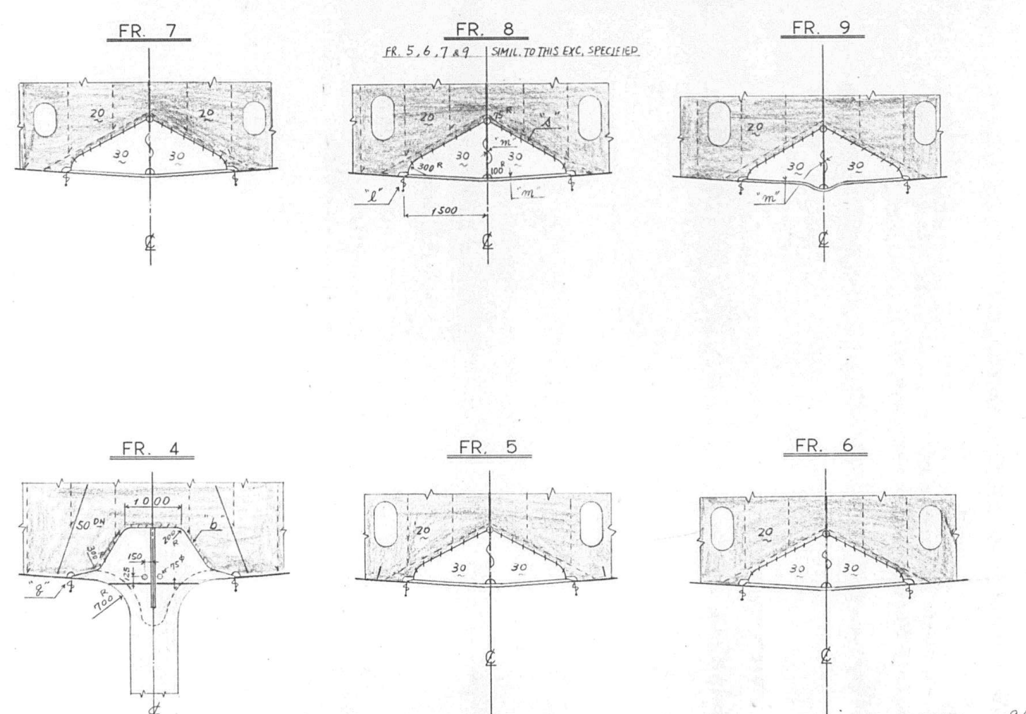
1454

FR. 1, 2 & 3



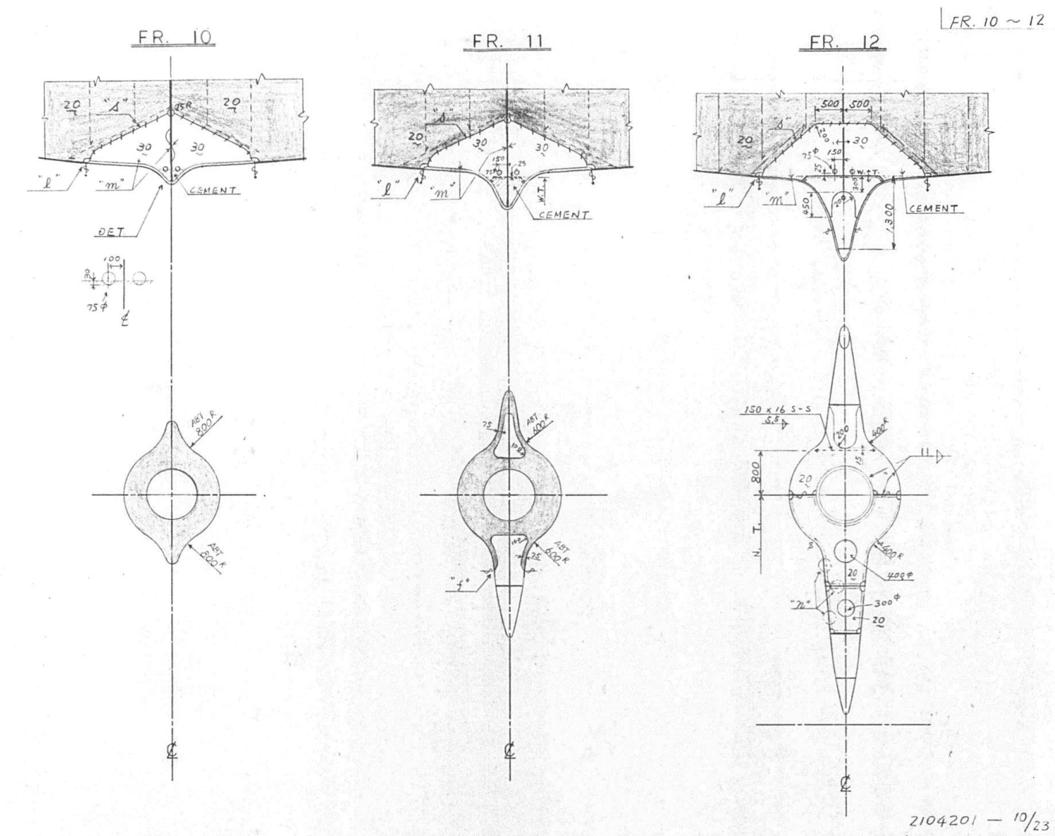
2104201 — 8/23

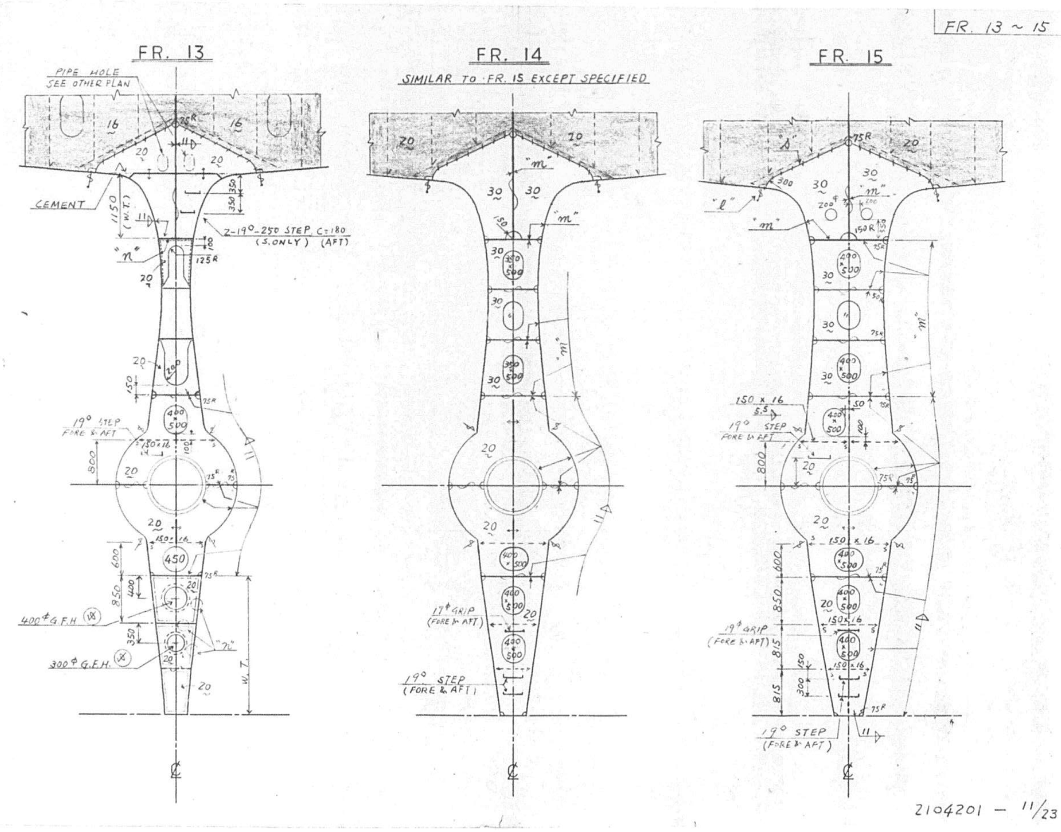
FR. 4 ~ 9



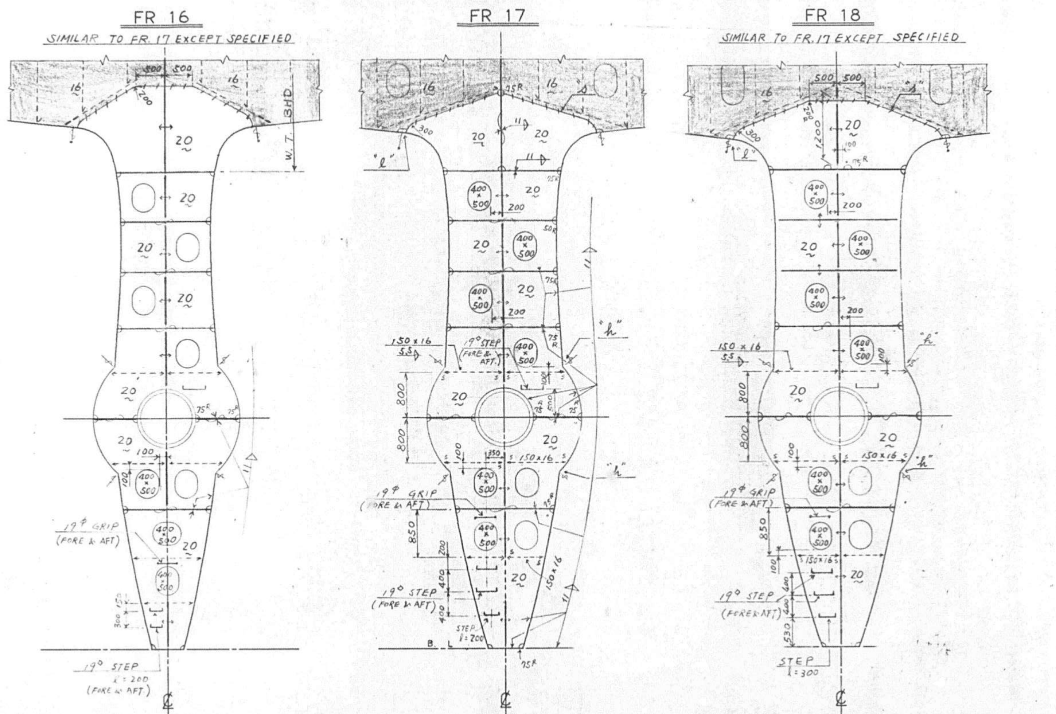
2104201 — 9/23

1455


FR. 10 ~ 12
FR. 10
FR. 11
FR. 12
CEMENT
DET
2104201 — 10/23

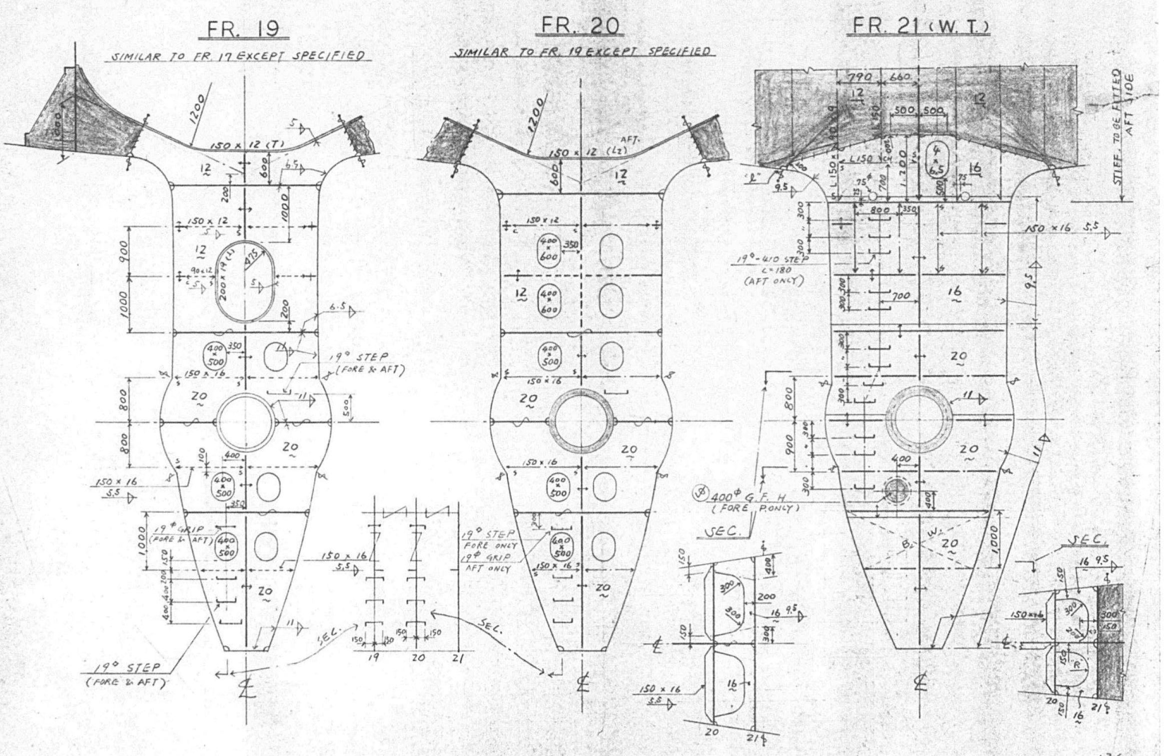

FR. 13 ~ 15
FR. 13
FR. 14
SIMILAR TO FR. 15 EXCEPT SPECIFIED
FR. 15
PIPE HOLE SEE OTHER PLAN
CEMENT
2-19° - 250 STEP, C=180 (S. ONLY) (AFT)
19° STEP FORE & AFT
400φ G.F.H.
300φ G.F.H.
17φ GRIP (FORE & AFT)
19° STEP (FORE & AFT)
19φ GRIP (FORE & AFT)
2104201 — 11/23

FR. 16 ~ 18



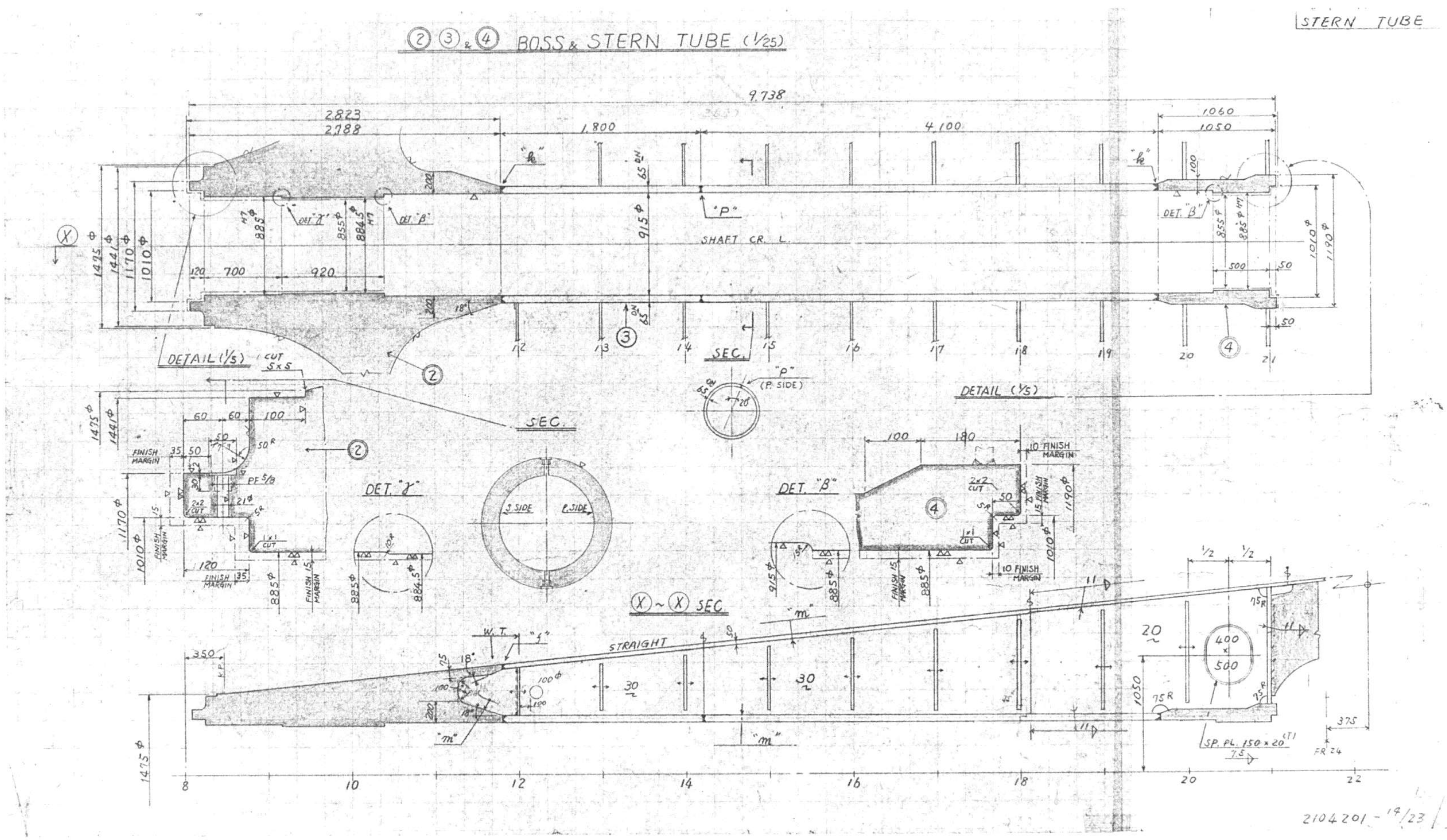
2104201- 12/23

FR. 19 ~ 21



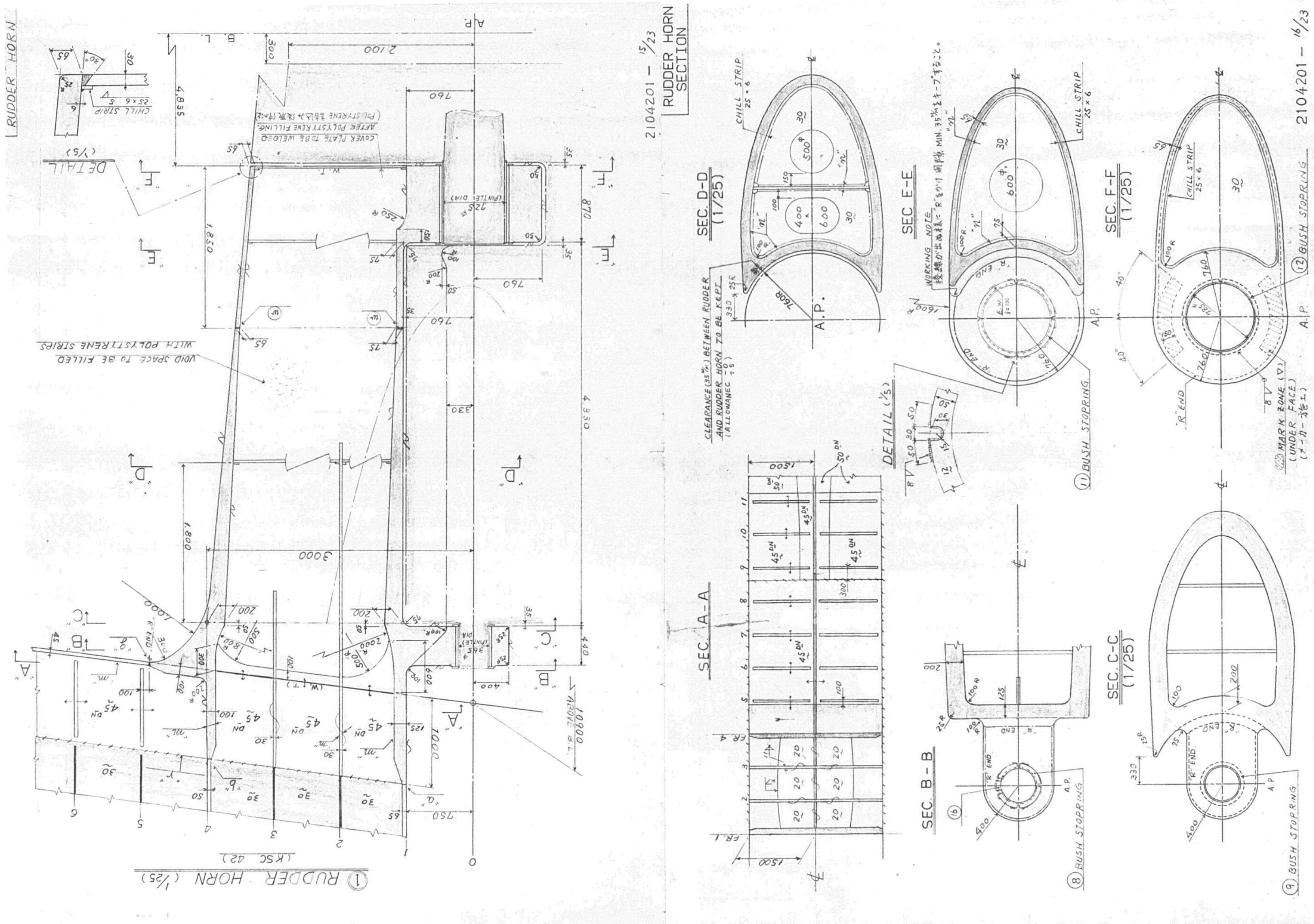
2104201 - 13/23

1457



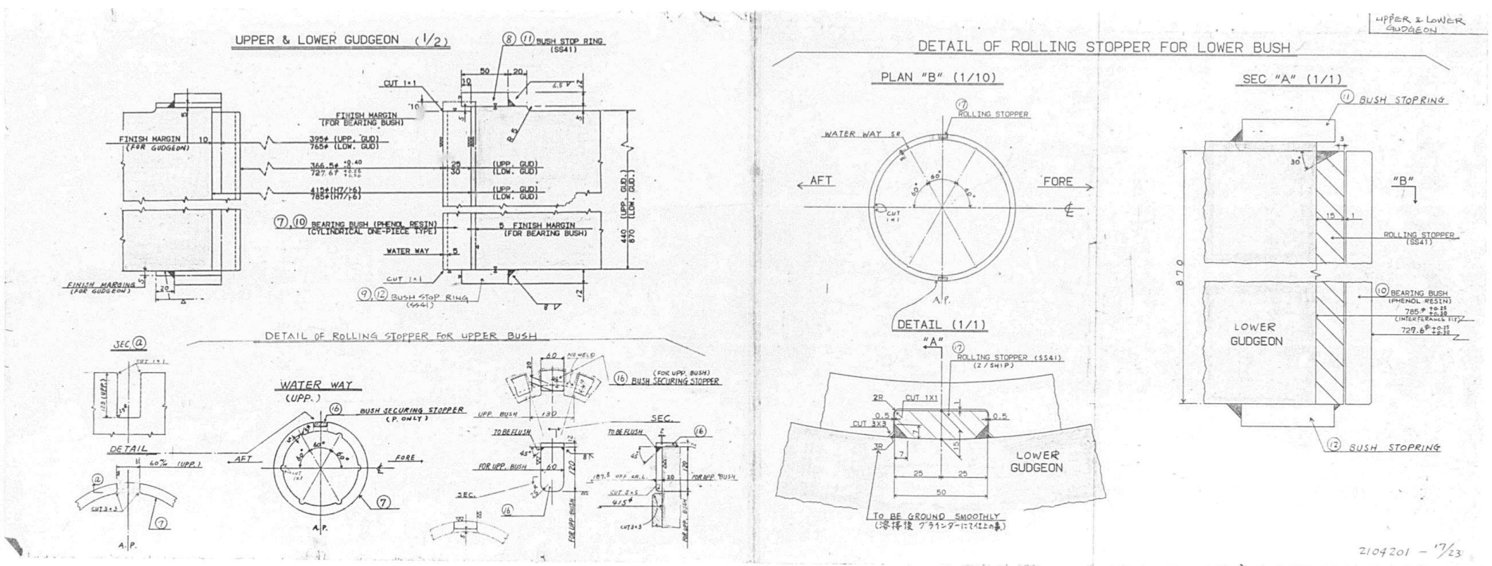
STERN TUBE
②③&④ BOSS & STERN TUBE (1/25)
DETAIL (1/5)
SEC.
DET. "γ"
DET. "β"
DETAIL (1/5)
Ⓧ~Ⓧ SEC.
STRAIGHT
SHAFT CR. L.
2104201-19/23

1458



2104201 - 15/23
RUDDER HORN SECTION
① RUDDER HORN (1/25)
(KSC A2)
DETAIL (1/5)
CHILL STRIP 25×6
COVER PLATE TO BE WELDED AFTER POLYSTYRENE FILLING
VOID SPACE TO BE FILLED WITH POLYSTYRENE STRIPS
2104201 - 16/23
SEC. D-D (1/25)
SEC. E-E
SEC. F-F (1/25)
SEC. C-C (1/25)
SEC. A-A
SEC. B-B
WORKING NOTE
CLEARANCE (35%) BETWEEN RUDDER AND RUDDER HORN TO BE KEPT
DETAIL (1/5)
⑪ BUSH STOPRING
⑫ BUSH STOPRING
⑧ BUSH STOPRING
⑨ BUSH STOPRING
MARK ZONE (UNDER FACE)
A.P.

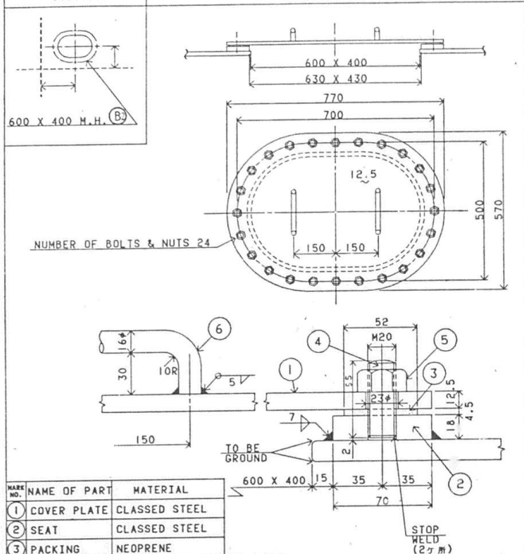
1459


UPPER & LOWER GUDGEON (1/2)
BUSH STOP RING (SS41)
FINISH MARGIN (FOR GUDGEON)
FINISH MARGIN (FOR BEARING BUSH)
BEARING BUSH (PHENOL RESIN) (CYLINDRICAL ONE-PIECE TYPE)
WATER WAY
CUT 1×1
DETAIL OF ROLLING STOPPER FOR UPPER BUSH
WATER WAY (UPP.)
BUSH SECURING STOPPER
AFT
FORE
A.P.
DETAIL OF ROLLING STOPPER FOR LOWER BUSH
PLAN "B" (1/10)
SEC "A" (1/1)
ROLLING STOPPER
BUSH STOPRING
DETAIL (1/1)
ROLLING STOPPER (SS41) (2/SHIP)
LOWER GUDGEON
TO BE GROUND SMOOTHLY
UPPER & LOWER GUDGEON
2104201 - 7/23

船舶設計標準

制定	42. 7. 19. / 4改 52. 8. 31. / 5改 57. 12. 15.	マンホール (B2) MANHOLE	MES SD 39422
作成部所	玉船設一般		

MARK / DETAIL



MARK NO.	NAME OF PART	MATERIAL
1	COVER PLATE	CLASSED STEEL
2	SEAT	CLASSED STEEL
3	PACKING	NEOPRENE
4	STUD BOLT	MILD STEEL (SS41)
5	NUT	MILD STEEL (SS41)
6	HAND BAR	MILD STEEL (SS 41)

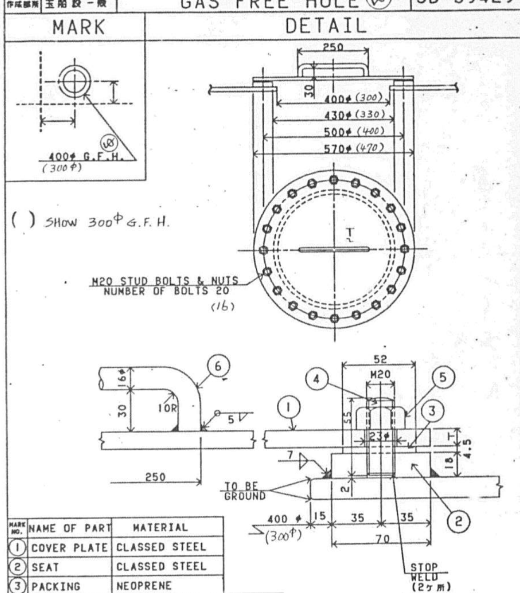
関連規格	JIS F 2304 / 艤装工事区分 D 2002 / T=12.5はLR RULE (1976)による	制定者 石崎	課長 越川	作成者 石津	幹事 田中

Z104201 - 18/23

船舶設計標準

制定	48. 1. 9. / 1改 52. 8. 31. / 2改 57. 12. 15.	ガス抜用孔 GAS FREE HOLE (V8)	MES SD 39429
作成部所	玉船設一般		

MARK / DETAIL



MARK NO.	NAME OF PART	MATERIAL
1	COVER PLATE	CLASSED STEEL
2	SEAT	CLASSED STEEL
3	PACKING	NEOPRENE
4	STUD BOLT	STAINLESS STEEL (SUS 304)
5	NUT	BRASS
6	HAND BAR	MILD STEEL (SS 41)

TO BE SPECIFIED WHEN T: 16

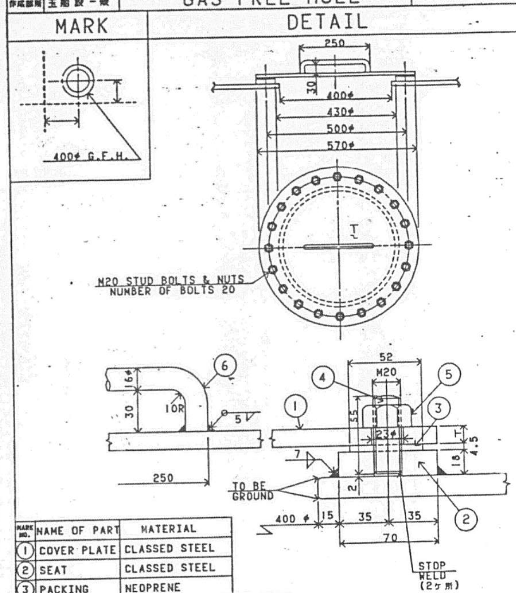
P: PRESS. HEAD kg/cm²	T
P≤2.5	12.5
P>2.5	16

関連規格	JIS F 2304 / 艤装工事区分 D 2002 / T=12.5はLR RULE (1976)による	制定者 石崎	課長 越川	作成者 石津	幹事 田中

船舶設計標準

制定	48. 1. 9. / 1改 52. 8. 31. / 2改 57. 12. 15.	ガス抜用孔 GAS FREE HOLE	MES SD 39429
作成部所	玉船設一般		

MARK / DETAIL



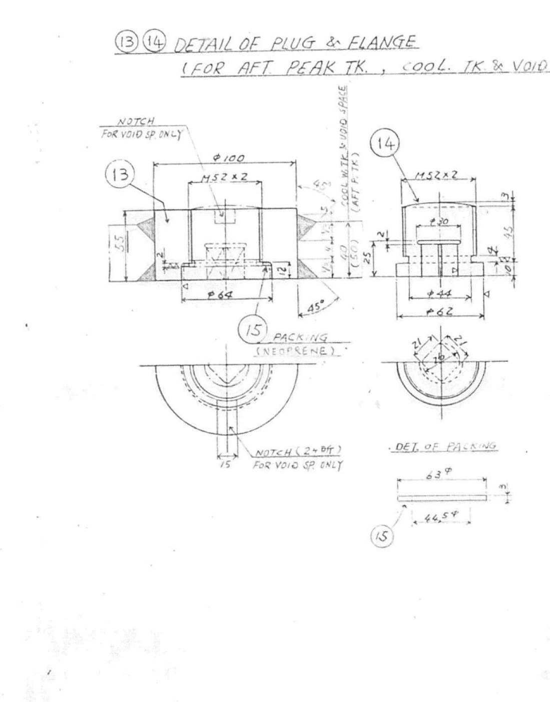
MARK NO.	NAME OF PART	MATERIAL
1	COVER PLATE	CLASSED STEEL
2	SEAT	CLASSED STEEL
3	PACKING	NEOPRENE
4	STUD BOLT	MILD STEEL (SS41)
5	NUT	MILD STEEL (SS41)
6	HAND BAR	MILD STEEL (SS 41)

TO BE SPECIFIED WHEN T: 16

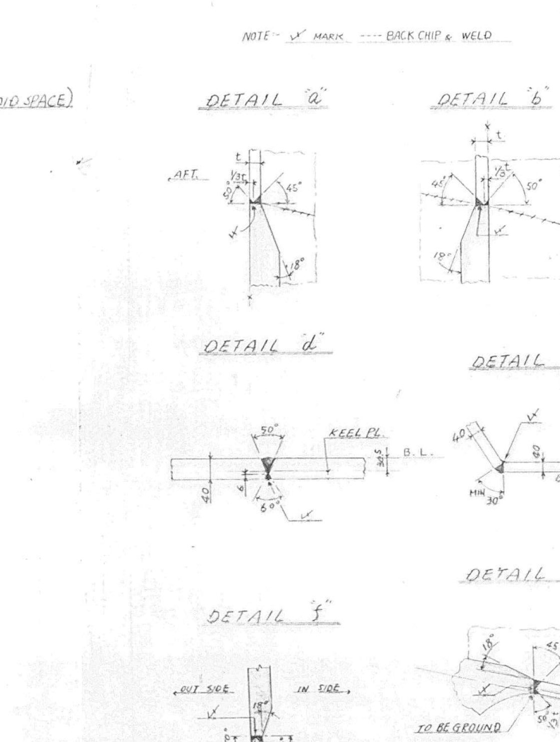
P: PRESS. HEAD kg/cm²	T
P≤2.5	12.5
P>2.5	16

関連規格	JIS F 2304 / 艤装工事区分 D 2002 / T=12.5はLR RULE (1976)による	制定者 石崎	課長 越川	作成者 石津	幹事 田中

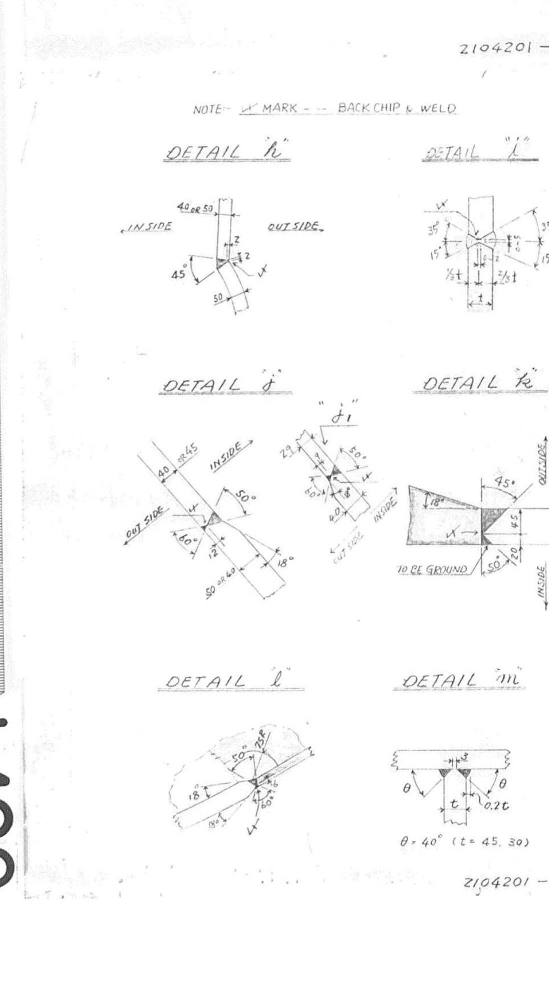
Z104201 - 19/



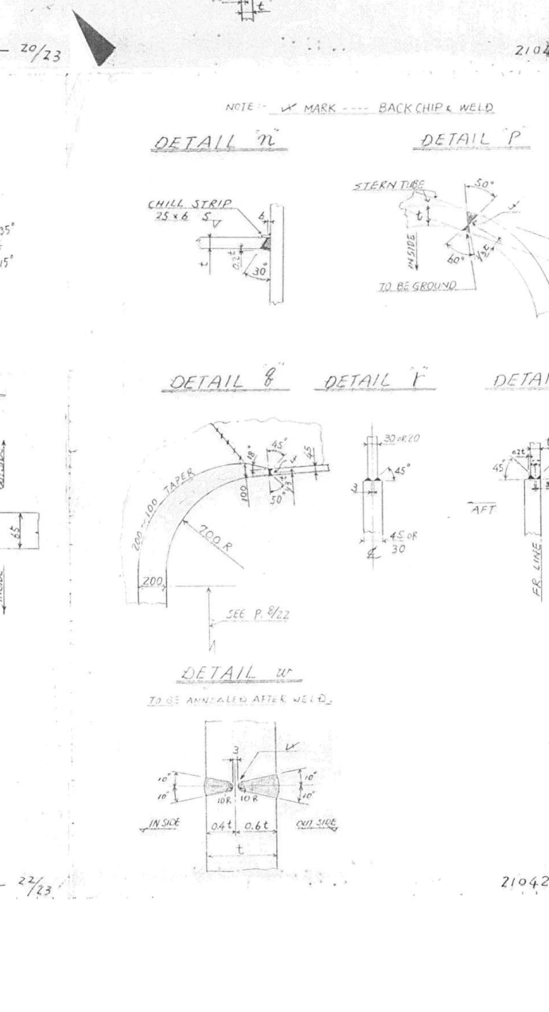
(13) (14) DETAIL OF PLUG & FLANGE
(FOR AFT PEAK TK., COOL. TK & VOID SPACE)
NOTCH
FOR VOID SP. ONLY
PACKING
(NEOPRENE)
NOTCH (2-6.4)
FOR VOID SP. ONLY
DET. OF PACKING
2104201 - 20/23



NOTE:- ✓ MARK ---- BACK CHIP & WELD
DETAIL "a"
DETAIL "b"
DETAIL "d"
DETAIL "e"
DETAIL "f"
DETAIL "g"
KEEL PL.
B.L.
BTM. PL.
OUT SIDE
IN SIDE
TO BE GROUND
2104201 - 21/23



NOTE:- ✓ MARK --- BACK CHIP & WELD
DETAIL "h"
DETAIL "i"
DETAIL "j"
"j1"
DETAIL "k"
DETAIL "l"
DETAIL "m"
INSIDE
OUT SIDE
TO BE GROUND
θ = 40° (t = 45, 30)
2104201 - 22/23



NOTE:- ✓ MARK ---- BACK CHIP & WELD
DETAIL "n"
DETAIL "P"
CHILL STRIP
25 × 6
STERN TUBE
INSIDE
TO BE GROUND
DETAIL "q"
DETAIL "r"
DETAIL "s"
200 R
SEE P. 8/22
AFT
FORE
FR. LINE
DETAIL "w"
TO BE ANNEALED AFTER WELD.
IN SIDE
OUT SIDE
2104201 - 23/23

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	20/MAR/85	OFTS/MES/202			12/MAR/85	T-8-2		
A	28/JUN/85	OFTS/MES/599			3/JUN/85	T-8-2		

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION
SEC.CHIEF

軸 系 計 算 書

CALCULATION OF SHAFTING & PROPELLER ACCORDING TO THE A.B.S. RULE

DATE MAR. 5. 1987 (TEL 2235)

JOB NO. TS1323/24/25 JOBCLASSIF.NO. E04-82	SCALE —	LYKES REF. NO. 440001	MITSUI DRAWING NO. 5124100

(13 SHEETS WITH COVER)

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	July/7/86 J.M

DWG.NO. 5124100

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1. SUMMARY OF THIS SHIP

1-1) Type of Ship

2442 TEU TYPE SINGLE SCREW
MOTOR CONTAINER SHIP

1-2) Hull Dimension

Lpp x B x D = 245 m x 32.2 m x 18.8 m

1-3) Main Engine

Type: Two stroke cycle, signal acting, solid injection, crosshead, direct reversible, turbocharged marine diesel engine, Mitsui B&W 9L80MCE
1 set per 1 ship

Output: 28800 PS x 83 r.p.m. (at M.C.O.)

1-4) Propeller

Type	:	Solid (Nonuniform pitch propeller)
Number	:	1 set per 1 ship
Number of revolution	:	83 r.p.m. (at M.C.O.)
Dia. of propeller	:	8.1 m
Number of blade	:	5
Expanded area ratio	:	0.646
Pitch ratio	:	0.980 (Mean pitch)
Boss ratio	:	0.173
Rake	:	0°
Material	:	NIKALIUM

1-5) Stern Tube Sealing

Type: SIMPLEX, COMPACT

1463

2. CALCULATION OF SHAFTING

The calculation is according to A.B.S 1984 Section 37.

2-1) Diameter of Intermediate Shaft (§37.19)

$D_1 = 100 \cdot K \cdot \sqrt[3]{(H/R)\ 41.95/(U + 16.3)}$ mm

D_1 = Required dia. of interm. shaft

K = 1.0 : Shaft design factor

H = 28800 PS : Horse power at rated speed

R = 83 r.p.m. : rpm at rated speed

U = 42 kg/mm² : Ultimate tensile strength of the material

$D_1 = 100 \times 1.0 \times \sqrt[3]{\frac{28800}{83} \times \frac{41.95}{42 + 16.3}}$

= 630.0 mm

Plus 2 mm in dia. (According to the specification)

= 630.0 + 2

= 632.0 mm

Designed 650 mm

(This designed dia. was decided after consideration of torsional vibration)

2-2) Diameter of Propeller Shaft (§37.19)

$D_2 = 100 \cdot K \cdot \sqrt[3]{(H/R)\{41.95/(U+16.3)\}}$ mm

D_2 = Required dia. of propeller shaft

K = 1.22 : Shaft design factor

H = 28800 PS : Horse power at rated speed

R = 83 r.p.m. : rpm at rated speed

U = 42 kg/mm² : Ultimate tensile strength of the material

$D_2 = 100 \times 1.22 \times \sqrt[3]{\frac{28800}{83} \times \frac{41.95}{42 + 16.3}}$

= 768.2 mm

Plus 3 mm in dia. (According to the specification)

= 768.2 + 3

= 771.2 mm

Designed 775 mm

2-3) Diameter of Inboard End of Propeller Shaft (§37.19)

$D_3 = 100 \cdot K \cdot \sqrt[3]{(H/R)\{41.95/(U+16.3)\}}$ mm

D_3 = Required dia. of inboard end of propeller shaft

K = 1.0 : Shaft design factor

H = 28800 PS : Horse power at rated speed

R = 83 r.p.m. : rpm at rated speed

U = 42 kg/mm² : Ultimate tensile strength of the material

$D_3 = 100 \times 1.0 \times \sqrt[3]{\frac{28800}{83} \times \frac{41.95}{42 + 16.3}}$

= 630.0 mm

Designed 680 mm

2-4) Shaft Coupling (§37.31)

A) Diameter of Coupling Bolts (§37.31.1)

$d_b = 0.65\sqrt{D^3(U + 16.3)/NBU_b}$ mm

d_b = Required dia. of bolts at joint

a) Forward Coupling of No.1 Interm. Shaft

D_1 = 630.0 mm : Required shaft dia. of interm. shaft

N = 8 : Number of bolts fitted in one coupling

B = 1184 mm : Bolt circle dia.

U = 42 kg/mm² : Minimum tensile strength of interm. shaft material

U_b = 58.5 kg/mm² : Minimum tensile strength of bolt material

$d_{b1} = 0.65 \times \sqrt{\frac{630^3 \times (42 + 16.3)}{8 \times 1184 \times 58.5}}$

= 105.4 mm

Designed 130 mm

b) Coupling of Interm. Shaft except item a)

b-1) Required Dia. for Coupling of Interm. Shaft except item a)

D_1 = 630.0 mm : Required dia. of interm. shaft

N = 12 : Number of bolts fitted in one coupling

B = 970 mm : Bolt circle dia.

U = 42 kg/mm² : Minimum tensile strength of interm. shaft material

U_b = 53 kg/mm² : Minimum tensile strength of bolt material

$d_{b2} = 0.65 \times \sqrt{\frac{630^3 \times (42 + 16.3)}{12 \times 970 \times 53}}$

= 99.9 mm

b-2) Required Dia. for Coupling of Propeller Shaft

D_3 = 630 mm : Required shaft dia. of inboard end of propeller shaft

N = 12 : Number of bolts fitted in one coupling

B = 970 mm : Bolt circle dia.

U = 42 kg/mm^2 : Minimum tensile strength of propeller shaft material

U_b = 53 kg/mm^2 : Minimum tensile strength of bolt material

$$db_3 = 0.65 \times \sqrt{\frac{630^3 \times (42 + 16.3)}{12 \times 970 \times 53}}$$

= 99.9 mm

Designed 110 mm

Note: The material of coupling bolts is to be steel with an elongation of not less than 16% and complying with the following.

$U \leqq U_b \leqq 1.7U$, where U_b is not more than 102 kg/mm^2

B) Thickness of Coupling Flange (§37.31.3)

a) Forward Coupling of No.1 Interm. Shaft

$T_1 > db_1$

$> 0.2 \times D_1$

T_1 = Thickness of coupling flange

db_1 = 105.4 mm : Required dia. of coupling bolts for forward coupling of interm. shaft

D_1 = 630.0 mm : Required dia. of interm. shaft

T_1 = 130 $> db_1$ = 105.4 mm
$> 0.2 \times D_1 = 0.2 \times 630 = 126.0$ mm

Designed 130 mm

b) Coupling of Interm. Shaft except item a)

$T_2 > db_2$

$> 0.2 \times D_1$

T_2 = Thickness of coupling flange

db_2 = 99.9 mm : Required dia. of coupling bolts for aft coupling of interm. shaft

D_1 = 630.0 mm : Required dia. of interm. shaft

T_2 = 130 $> db_2$ = 99.9 mm
$> 0.2 \times D_1 = 0.2 \times 630.0 = 126.0$ mm

Designed 130 mm

c) Coupling of Propeller Shaft

$T_3 > db_3$

$> 0.2 \times D_3$

T_3 = Thickness of coupling flange

db_3 = 99.9 mm : Required dia. of coupling bolts for coupling of propeller shaft

D_3 = 630.0 mm : Required dia. of inboard end of propeller shaft

T_3 = 130 $> db_3$ = 99.9 mm

$> 0.2 \times D_3 = 0.2 \times 630 = 126.0$ mm

Designed 130 mm

C) Fillet Radius at The Base of The Coupling Flange (§37.31.3)

a) Coupling of Interm. Shaft

$R_1 = 0.08 \times D_1^*$ mm

R_1 = Required fillet radius for coupling of interm. shaft

D_1^* = 650 mm : Actual dia. of interm. shaft

$R_1 = 0.08 \times 650$

= 52 mm

Designed 60 mm

b) Coupling of Propeller Shaft

$R_2 = 0.08 \times D_3^*$ mm

R_2 = Required fillet radius for coupling of propeller shaft

D_3^* = 680 mm : Actual dia. of inboard end of propeller shaft

$R_2 = 0.08 \times 680$

= 54.4 mm

Designed 60 mm

2-5) Propeller-End Bearing (§37.25.2)

$L = 2.0 \times D_2$ mm

L = Required length of propeller-end bearing

D_2 = 768.2 mm : Required dia. of propeller shaft

$L = 2.0 \times 768.2$

= 1536.4 mm

Designed 1590 mm

3. CALCULATION OF PROPELLER

The calculation is according to A.B.S. 1984. Section 37.

3-1) Thickness of Propeller Blade (§37.5.1)

A) Thickness of Propeller Blade at 25% Radius

$$t_{0.25} = S\left[289\sqrt{\frac{A\ H}{Cn\ C\ R\ N}} \pm \left(\frac{Cs}{Cn}\right)\left(\frac{BK}{4C}\right)\right] \quad mm$$

$A = 1.0 + (6.0/P_{0.7}) + 4.3\ P_{0.25}$

$B = (4300\ wa/N)(R/100)^2\ (D/20)^3$

$C = (1 + 1.5\ P_{0.25})(Wt - B)$

$S = 1.00$: For all propeller with $D \leqq 6.1$ m

$= \sqrt{(D + 24.0)/30.1}$: For solid propeller with $D > 6.1$m and weighing in excess of 20tons. (S is not to exceed 1.025.)

$t_{0.25}$ = Required thick. of prop. blade at 25% radius

H = PS : Horse power at rated speed

R = r.p.m. : r.p.m. at rated speed

N = : Number of blades

$P_{0.25}$ = : Pitch ratio at 25% radius

$P_{0.7}$ = : Pitch ratio at 70% radius

The calculation of propeller shall be submitted by the propeller manufacturer. (STONE MANGANESE MARINE)

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	86/4/25	OFTS/ABS-1138						

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. 1325 — SHIP'S NAME TILLIE LYKES

OUTFITTING DESIGN SECTION — SEC. CHIEF / ASST. CHIEF / CHARGE ENG'R / STAFF

軸系及推進器予備品要具目録

LIST OF SPARES & TOOLS FOR SHAFTING & PROPELLER

DATE (TEL 2235)

JOB NO. TS1323/24/25 — JOBCLASSIF. NO. E.04.02 — SCALE — LYKES REF. NO. 440003 — MITSUI DRAWING NO. 5124800

(11 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO.1324 AND S.NO.1325	July/7/86 S.M

DWG. NO. 5124800 (i)

SPARES — SHAFTING & PROPELLER

PAGE 1 — SHIP NO. 1323/4/5 — BOX NO. 35

NO.	NAME	SKETCH	MATERIAL	SUPPLY PER SHIP WORKING	SUPPLY PER SHIP SPARE	DRAWING NO.	PART NO.	REMARKS
1	REAMER BOLT & NUT FOR SHAFT COUPLING	M120×6, φ133, 580	FORGED STEEL ABS GR.4 (BOLT) SF45A (NUT)	8 sets	8 sets	5124201	④ ⑥	ON BOARD
2	REAMER BOLT & NUT FOR SHAFT COUPLING	M100×6, φ113, 427	FORGED STEEL ABS GR.3 (BOLT) SF45A (NUT)	24 sets	12 sets	5124201	③ ⑤	ON BOARD
3	SPLIT PIN	φ9.5, 140	STEEL WIRE	16	16	5124201	⑧	BOX NO. 35
4	SPLIT PIN	φ9.5, 120	STEEL WIRE	24	12	5124201	⑦	BOX NO. 35
5	PROPELLER SHAFT	TAPER: 1/20, φ775, 13700	FORGED STEEL ABS GR.2	1	(※) 1	5124203	①	(※) ONE SPARE SHAFT TO BE SUPPLIED PER SIX VESSEL.
6	STERN TUBE BEARING FWD. BUSH	φ888, 500	DUCTILE IRON & WHITE METAL ASTM A536 60-40-18 & WJ 2	1	(※) 2	5124302	③ ④	(※) TWO SPARE BUSHES TO BE SUPPLIED PER SIX VESSELS.

MFRS NAME & ADDRESS

SPARES — SHAFTING & PROPELLER

PAGE 2 — SHIP NO. — BOX NO. 35

NO.	NAME	SKETCH	MATERIAL	SUPPLY PER SHIP WORKING	SUPPLY PER SHIP SPARE	DRAWING NO.	PART NO.	REMARKS
7	ALUMINUM ANODE	200, 100, 16	ALMINUM	4	4	5124302	⑫	
8	PROPELLER	5 BLADES, φ8100	NIKALIUM	1	(※) 1	5124700	①	(※) ONE SPARE PROPELLER TO BE SUPPLIED PER SIX VESSELS.
9	PACKING	t=2, φ1200, P.C.D.950, φ1000	NEOPLANE RUBBER	1	1	5124700	②	
10	PACKING FOR STUFFING BOX	LENGTH ≒ abt. 6200, 45, 45	RAMIE	1	1	5124306	⑧	

MFRS NAME & ADDRESS

1467

SPARE PARTS

SIMPLEX COMPACT SEAL (1 SET) TYPE 850

PAGE 3 | SHIP NO. 1323/4/5 | BOX NO. 35

NO.	NAME	SKETCH	MATERIAL	SUPPLY PER SHIP WOR-KING	SPA-RE	DRAWING NO.	PART NO.	REMARKS
1	RUBBER RING FOR AFT COMPACT SEAL		SYNTHETIC RUBBER	1	1	C-850001	17	
2	RUBBER RING FOR FORE COMPACT SEAL		SYNTHETIC RUBBER	1	1	C-850002	16	
3	FLANGE PACKING FOR AFT COMPACT SEAL		VULCANIZED PACKING	2	2	C-850001	23	*NON-ASBESTOS TYPE
4	FLANGE PACKING FOR AFT COMPACT SEAL		VULCANIZED PACKING	1	1	C-850001	25	*NON-ASBESTOS TYPE
5	FLANGE PACKING FOR FORE COMPACT SEAL		VULCANIZED PACKING	2	2	C850002	26	*NON-ASBESTOS TYPE

MFR'S NAME & ADDRESS: KOBE STEEL, LTD., KURE PLANT. 8-1, SHOWA-CHO KURE, HIROSHIMA JAPAN.

SPARE PARTS

SIMPLEX COMPACT SEAL (1 SET) TYPE 850

PAGE 4 | SHIP NO. 1323/4/5 | BOX NO. 35

NO.	NAME	SKETCH	MATERIAL	SUPPLY PER SHIP WOR-KING	SPA-RE	DRAWING NO.	PART NO.	REMARKS
6	RUBBER RING FOR AFT COMPACT SEAL		SYNTHETIC RUBBER	2	2	C-850001	29	1AP-13 (JIS)
7	HEXAGON HEAD SCREW (AFT COMPACT SEAL)	M24, 75	STAINLESS STEEL		20	C-850001	7	

MFR'S NAME & ADDRESS: KOBE STEEL, LTD., KURE PLANT. 8-1, SHOWA-CHO KURE, HIROSHIMA JAPAN.

SPARES

TORSION METER

PAGE 5 | SHIP NO. 1323/4/5 | BOX NO. 35

NO.	NAME	SKETCH	MATERIAL	SUPPLY PER SHIP WORKING	SPARE	DRAWING NO.	PART NO.	REMARKS
1	TONES GENERATOR P.C.B (S2-E-20446)				1			
2	POWER SUPPLIES P.C.B (S2-E-19695) (077-018-738)				1			
3	TORQUE RECEIVER P.C.B (S2-E21161)				1			
4	SPEED & HORSE POWER PCB (S2-E21226)				1			
5	LAMP DC24V 50mA (02/903)				5			
6	LAMP DC24V 50mA (01/903)				5			
7								
8								
9								
10								

MFRS NAME & ADDRESS

TOOLS

SHAFTING & PROPELLER

PAGE 6 | SHIP NO. 1323/4/5 | BOX NO. 35

NO.	NAME	SKETCH	MATERIAL	SUPPLY PER SHIP WORKING	SPARE	DRAWING NO.	PART NO.	REMARKS
1	SPANNER FOR COUPLING BOLT	170, 525	FORGED STEEL SF45	1				ON BOARD
2	SPANNER FOR COUPLING BOLT	145, 450	FORGED STEEL SF45	1				ON BOARD
3	SPANNER FOR PROP. NUT	500	MILD STEEL SS41	2		5124203	⑤	in store
4	JOINT PLUG FOR PROP. FITTING & WITHDRAWAL	PF¼, PT⅜, 30, 20, 85	CA104	4		5124700	④	BOX NO. 35
5	SNAP JOINT & WASHER FOR PROP. FITTING & WITHDRAWAL		MAKER'S STANDARD MATERIAL	set 4				BOX NO. 35
6	GEARED TROLLEY FOR PROP. SHAFT WITHDRAWAL		MAKER'S STANDARD MATERIAL	2 SET				FOR 30 TON ON BOARD

MFRS NAME & ADDRESS

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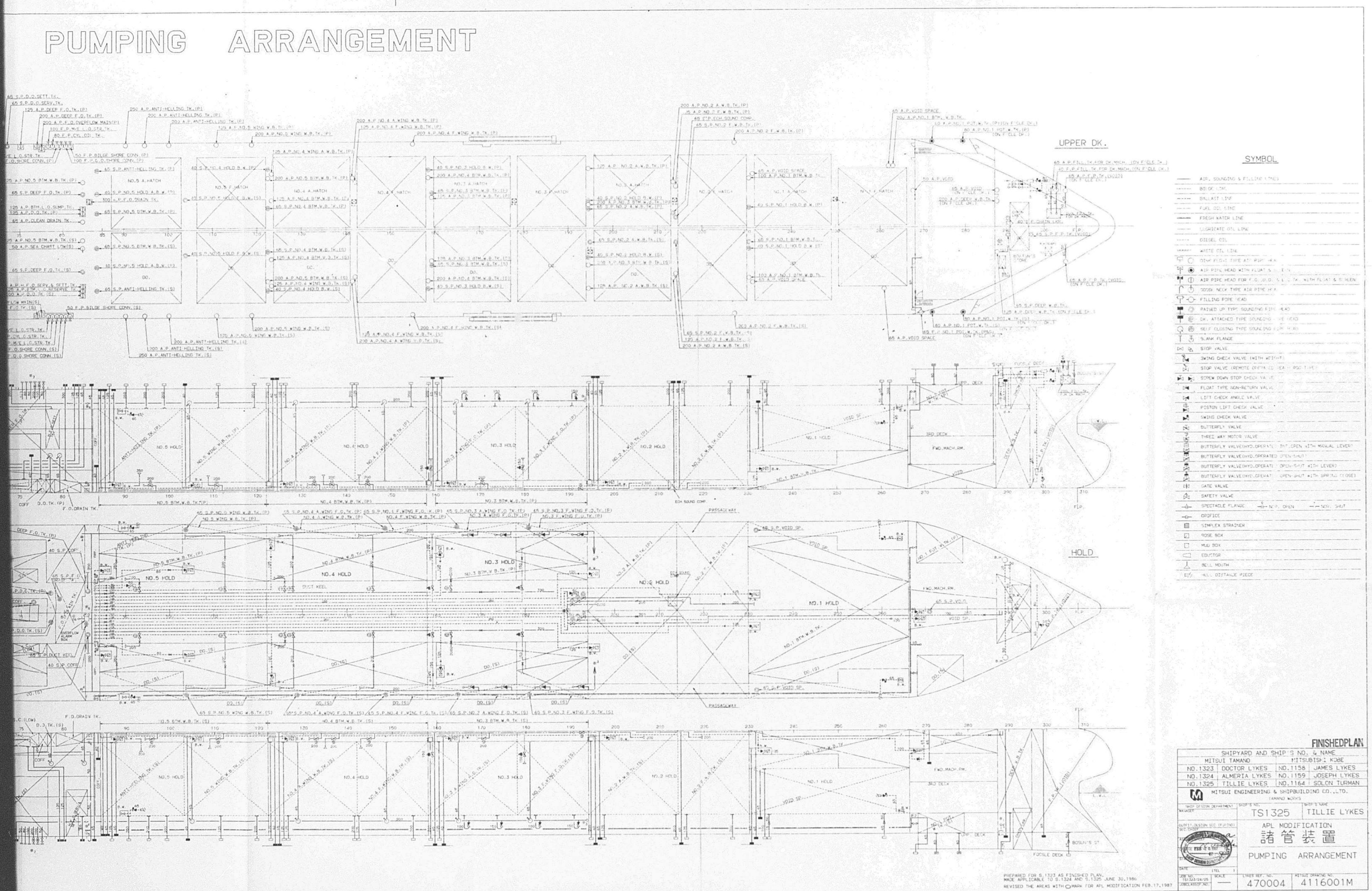
TOOLS							PAGE	7
SHAFTING & PROPELLER							SHIP NO.	1323/4/5
							BOX NO.	35
NO.	NAME	SKETCH	MATERIAL	SUPPLY PER SHIP WORKING	SUPPLY PER SHIP SPARE	DRAWING NO.	DRAWING PART NO.	REMARKS
7	EYE PLATE FOR PROPELLER SHAFT WITHDRAWAL		MILD STEEL SS41	1				ON BOARD
8	BOLT FOR EYE PLATE OF PROP. SHAFT WITHDRAWAL		MILD STEEL SS41	4				
9	LOCKING DEVICE FOR INTERM. SHAFT BEARING (UPP. HALF)		MILD STEEL SS41	2				ON BOARD
10	LOCKING DEVICE FOR INTERM. SHAFT BEARING (LOWER HALF)		MILD STEEL SS41	2				ON BOARD
11	BOLT & NUT FOR LOCKING DEVICE OF INTERM. SHAFT BEARING		MILD STEEL SS41	4 sets				
12	BOLT & NUT FOR LOCKING DEVICE OF INTERM. SHAFT BEARING		MILD STEEL SS41	8 sets				ON BOARD
13	COPPER PLATE		COPPER	4				
MFRS NAME & ADDRESS								

TOOLS							PAGE	8	
SIMPLEX COMPACT SEAL (1 SET) TYPE 850							SHIP NO.	1323/4/5	
							BOX NO.	35	
NO.	NAME	SKETCH	MATERIAL	SUPPLY PER SHIP WORKING	SUPPLY PER SHIP SPARE	DRAWING NO.	DRAWING PART NO.	REMARKS	
1	WEAR DOWN GAUGE & BOX (AFT COMPACT SEAL)		STEEL LEATHERET	1 SET		C-850001	15		
2	MOUNTING STRAP (AFT COMPACT SEAL)		MILD STEEL	8		C-850001	16		
3	TRANSPORT TOOL (AFT & FORE COMPACT SEAL)		STEEL	1 1		C-850001 C-850002	20 20		
4	CYLINDER HEAD SCREW (AFT & FORE COMPACT SEAL)		STEEL	2 2		C-850001 C-850002	21 21		
5	HEXAGON HEAD SCREW (FORE COMPACT SEAL)		STEEL	4		C-850002	14		
6									
MFR'S NAME & ADDRESS		KOBE STEEL, LTD., KURE PLANT.				8-1, SHOWA-CHO KURE, HIROSHIMA JAPAN.			

TOOLS							PAGE	9
SIMPLEX COMPACT SEAL (1 SET) TYPE 850							SHIP NO.	1323/4/5
							BOX NO.	35
NO.	NAME	SKETCH	MATERIAL	SUPPLY PER SHIP WORKING	SUPPLY PER SHIP SPARE	DRAWING NO.	DRAWING PART NO.	REMARKS
7	HEXAGON WRENCH FOR SCREW (AFT & FORE COMPACT SEAL)		STEEL	1				
8	HEXAGON WRENCH FOR DRAWER SCREW (AFT & FORE COMPACT SEAL)		STEEL	1				
9	DRAWER SCREW (AFT & FORE COMPACT SEAL)		STEEL	2				
10	HEXAGON WRENCH FOR SCREW (FORE COMPACT SEAL)		STEEL	1				
11	TOOL BOX		STEEL	1				
MFR'S NAME & ADDRESS		KOBE STEEL, LTD., KURE PLANT.				8-1, SHOWA-CHO KURE, HIROSHIMA JAPAN.		

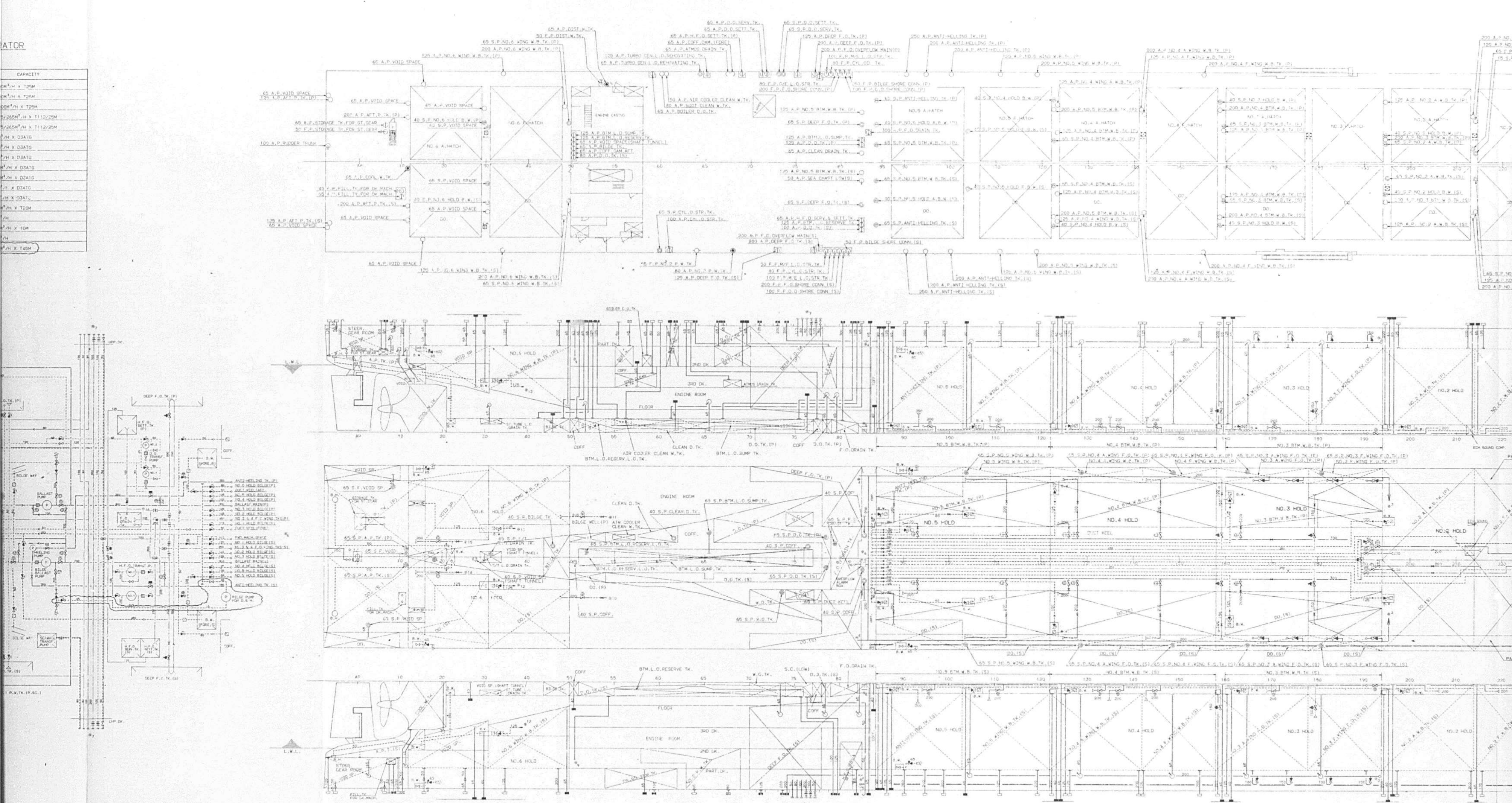
1469


PUMPING ARRANGEMENT
UPPER DK.
SYMBOL
HOLD
FINISHEDPLAN
SHIPYARD AND SHIP'S NO. & NAME
MITSUI TAMANO
MITSUBISHI KOBE
NO.1323 DOCTOR LYKES
NO.1158 JAMES LYKES
NO.1324 ALMERIA LYKES
NO.1159 JOSEPH LYKES
NO.1325 TILLIE LYKES
NO.1164 SOLON TURMAN
MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS
TS1325
TILLIE LYKES
APL MODIFICATION
諸管装置
PUMPING ARRANGEMENT
470004
4116001M
REVISED THE AREAS WITH ○ MARK FOR APL MODIFICATION FEB.17,1987

1/3

1470

M.V. TILLIE LYKES PUMPING ARRANGEMENT



2/3

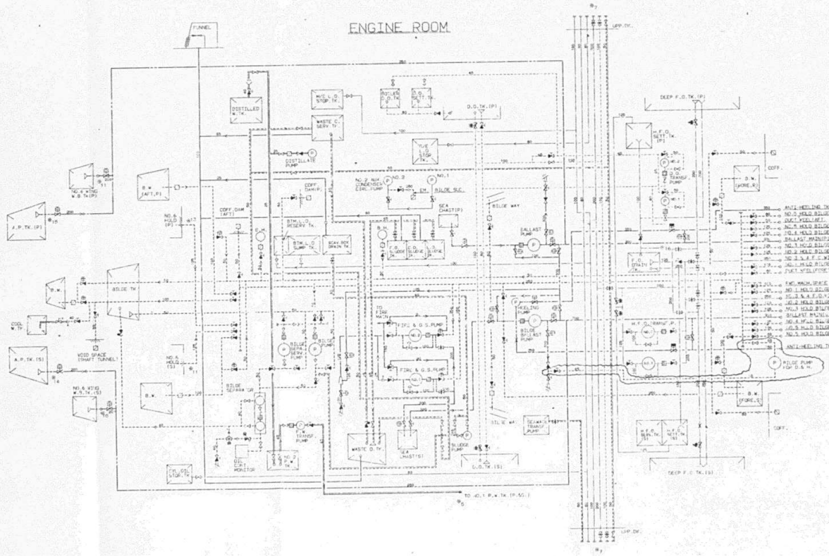
1471

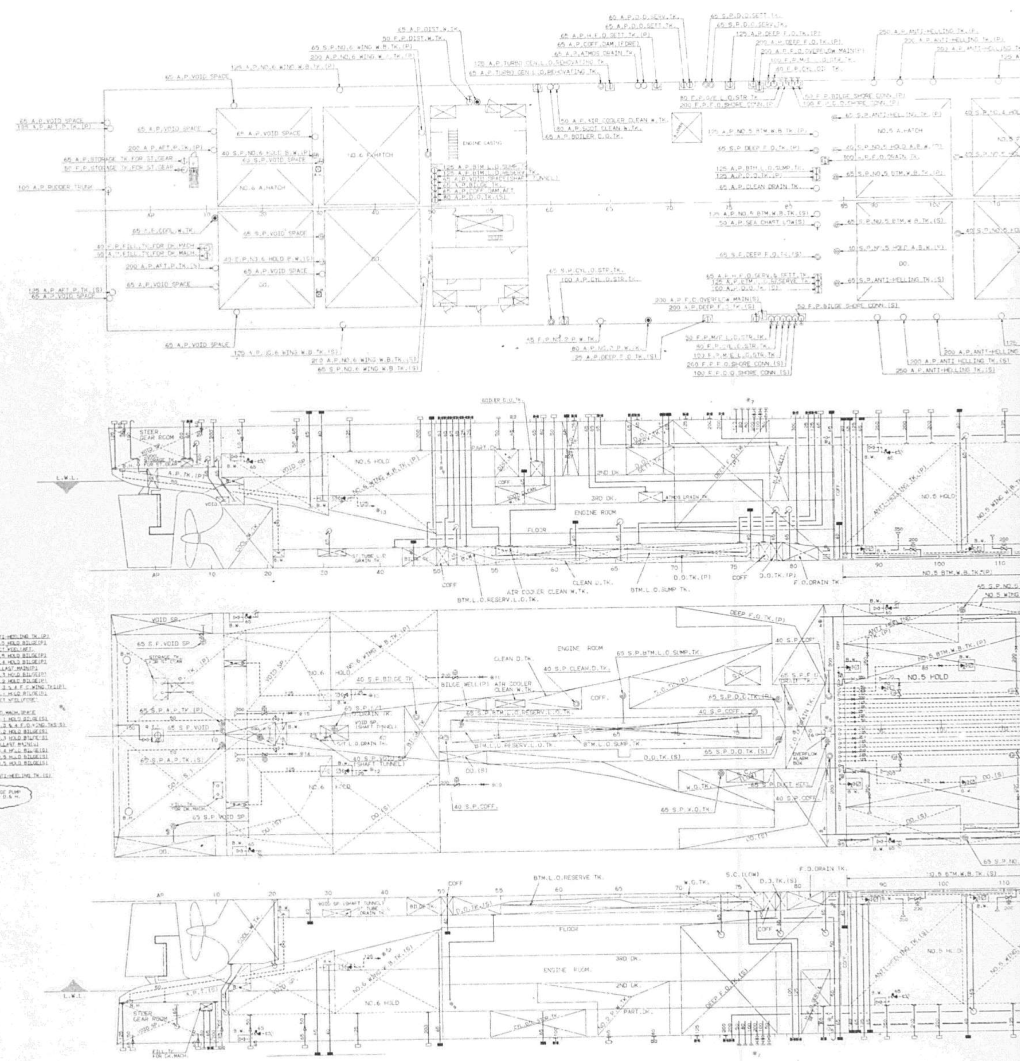
M.V. TILLIE LYKES PUMPING A

PUMPS, EDUCTOR & SEPARATOR

ITEM	TYPE	CAPACITY
BALLAST PUMP	EL.VER.CENT.	$500M^3/H$ X T25M
BILGE & BALLAST PUMP	EL.VER.CENT.	$500M^3/H$ X T25M
HEELING PUMP	EL.VER.PROPEL.	$1000M^3/H$ X T25M
NO.1 FIRE & G.S.PUMP	EL.VER.CENT.	$175/265M^3/H$ X T112/25M
NO.2 FIRE & G.S.PUMP	EL.VER.CENT.	$175/265M^3/H$ X T112/25M
BILGE PUMP	EL.VER.RECIPRO.	$5M^3/H$ X D3ATG
BILGE SEPARATOR SERVICE PUMP	EL.VER.RECIPRO.	$5M^3/H$ X D3ATG
SLUDGE PUMP	EL.HOR.SNAKE	$2M^3/H$ X D3ATG
NO.1 H.F.O.TRANSFER PUMP	EL.VER.GEAR	$50M^3/H$ X D3ATG
NO.2 H.F.O.TRANSFER PUMP	EL.VER.GEAR	$50M^3/H$ X D3ATG
NO.1 D.O.TRANSFER PUMP	EL.HOR.GEAR	$5M^3/H$ X D3ATG
NO.2 D.O.TRANSFER PUMP	EL.HOR.GEAR	$5M^3/H$ X D3ATG
F.W.TRANSFER PUMP	EL.VER.CENT.	$15M^3/H$ X T20M
DISTILLATE PUMP		$2M^3/H$
BALLAST EDUCTOR		$60M^3/H$ X 10M
BILGE SEPARATOR		$5M^3/H$
BILGE PUMP FOR C & H	DIAPHRAGM	$10M^3/H$ X T45

ENGINE ROOM





1/69

APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	FEB.18.'85	STL/MES/100			FEB.11.'85	T-P-2		
△	JUNE 17 '85	STL/MES-167	DEC.28.'85	M-00824	APR.8 '86	T-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC.(PIPING) SEC.CHIEF

PIPING PRACTICE

DATE (TEL 2240)

JOB NO. TS1323/24/25 — SCALE ~ — LYKES REF. NO. 480001 — MITSUI DRAWING NO. 4116002

(69 SHEETS WITH COVER)

2/69

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN.	June 20,'86
		MADE APPLICABLE TO S.1324 AND S.1325.	

DWG. NO. 4116002

3/69

GENERAL NOTE

1. THIS DRAWING SHALL BE APPLIED FOR ALL PIPING SYSTEMS ON THE VESSEL
   (INCLUDING FOR FIRE-FIGHTING SYSTEMS
   i.e. FIRE & WASH DECK PIPING
   CO_2 FIRE EXTINGUISH. PIPING)

FOR USCG APPROVAL MATTER

1) FIRE & WASH DECK PIPING
   PAGE 4, 11, 12, 16, 18, 19, 28, 33, 34, 36~42, 50~53, 55 & 62

2) CO_2 FIRE EXTINGUISH PIPING
   PAGE 4, 11, 12, 16~24, 28, 33, 34, 36~42, 50~53, 55 & 62

DWG.NO. 4116002

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REFERENCE

NO.	LYKES REF. NO.	DWG. NO.	DWG. NAME
1	482601	4116004	COMPARISION TABLE OF ASTM AND JIS MATERIAL FOR PIPE JOINTS.
2	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPES
3	482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS
4	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES & COPPER ALLOY (90-10 COPPER NICKEL) PIPES
5	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
6	482606	5131202	COMPARISION TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
7	482607	5131203	CALUCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
8	482608	5131205	GASKET (GENERAL USE)

DWG.NO. 4116002

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1. GENERAL

1.1.1 PIPE LIST (HULL PART)

MARK	NAME	DWG. NO. OF DIAG.
MS	HYD. OIL SUPPLY FOR DK. MACHINERY	4101401
MR	〃 〃 RETURN	〃
MR	〃 〃 〃 FOR STEER. GEAR	4117101
MC	COOL. WATER FOR DK. MACHINERY	4101401
OS	HYD. OIL SUPPLY FOR SLIDING DOOR	4120301
OR	〃 〃 RETURN 〃 〃	〃
WD	FIRE & WASH DK.	4116101
BW	BALLAST WATER	4116201
BL	BILGE	〃
FO	FUEL OIL	〃
VS	HYD. OIL SUPPLY FOR VALVE REMOTE CONT.	4116301
VR	〃 〃 RETURN 〃 〃 〃	〃
FC	CENTRAL CLEANING	4116105
SC	SCUPPER	4116601
AP	AIR PIPE	4116701
SD	SOUNDING	〃
FL	FILLING FOR POTABLE WATER	〃
PN	PNEUMACATOR	4116705
HS	HEATING (SUPPLY)	4116801
HR	〃 (RETURN)	〃
CA	COMPRESSED AIR	4117401
TY	〃 〃 FOR WHISTLE	〃
EP	PROTECT PIPE FOR EL. CABLE	
CO	CO_2 SYSTEM	4119101

1. GENERAL

1.1.2 PIPE LIST (MACHINERY PART) 1/2

MARK	NAME	DWG. NO. OF DIAG.
1A	HIGH PRESSURE AIR	5131000
2A	MISCELL. SERVICE AIR (HIGH)	〃
3A	〃 〃 〃 (LOW.)	〃
4A	ATMOS. OPEN AIR	〃
2C	CONTROL AIR (7 kg/cm²)	〃
3C	〃 〃 (AFTER FILT. REG.)	〃
4C	ATMOS. OPEN CONTROL AIR	〃
2D	HIGH PRESSURE DRAIN	〃
3D	LOW. 〃 〃	〃
5D	ALL OTHER DRAIN	〃
6D	ATMOS. OPEN DRAIN	〃
1E	EXHAUST STEAM	〃
2E	ATMOS. EXHAUST STEAM	〃
1F	F. W. SERVICE, DRINKING & HOT WATER	〃
2F	COOLING FRESH WATER	〃
3F	FEED WATER	〃
5F	CONDENSATE	〃
6F	OPEN FRESH WATER DRAIN	〃
1G	EXHAUST GAS	〃
1H	F. O. (BUNKER OIL SERVICE)	〃
2H	〃 (DIESEL 〃 〃)	〃
4H	〃 (TRANSFER)	〃
5H	〃 (PURIFICATION)	〃
6H	〃 (OPEN DRAIN)	〃
1L	L. O. (SERVICE)	〃
2L	〃 (SHIFT)	〃
3L	〃 (TURBO-CH.)	〃
4L	〃 (STERN TUBE)	〃
5L	〃 (PURIFICATION)	〃
6L	〃 (SOUNDING)	〃
7L	〃 (OPEN DRAIN)	〃
2S	HIGH REDUCED STEAM	〃
3S	LOW. 〃 〃	〃

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1. GENERAL

1.1.2 PIPE LIST (MACHINERY PART) 2/2

MARK	NAME	DWG. NO. OF DIAG.
6S	TANK HEATING COIL	5131000
7S	ATMOS. OPEN STEAM	〃
1W	BILGE	〃
2W	BALLAST	〃
4W	FIRE	〃
7W	MAIN COOLING SEA WATER	〃
8W	AUX. & MISCELL. COOLING SEA WATER	〃
9W	OPEN BILGE	〃
LW	SEA SUC. & OVERB'D DISCHARGE	〃

1. GENERAL

1.1.3 PIPE LIST (ACCOMM. PART)

MARK	NAME	DWG. NO. OF DIAG.
AD	DRAINAGE (ACCOMMODATION)	4116501
AV	AIR VENT FOR SOIL	〃
SO	SOIL	〃
FW	FRESH WATER	4116401
HW	HOT WATER	4116401
PO	POTABLE WATER	〃
CW	COOLING WATER	〃
GS	GENERAL SERVICE STEAM	〃
GR	〃 〃 DRAIN	〃
RA	REFRIG. PIPE FOR AIR CON.	4115301
RB	REFRIG. PIPE FOR REF. PROVISION	4113201
OS	HYD. OIL SUPPLY FOR BOW THRUSTER	4117150
OR	HYD. OIL RETURN FOR BOW THRUSTER	〃
OS	HYD. OIL SUPPLY FOR SIDE PORT DOOR	4120215
OR	HYD. OIL RETURN FOR SIDE PORT DOOR	〃
VA	CONTROL AIR PIPE FOR AIR CONDITIONING IN ACCOMM. SPACE	4115303
CA	DIAGRAM OF REMOTE CONT. AIR PIPING FOR SEA VALVE IN FWD. MACH. SP.	4116402

1.2 PIPE DIMENSION TABLE

1.2.1. STEEL PIPES AND STAINLESS PIPES DIMENSION TABLE — JIS STANDARD

NOMINAL PIPE SIZE mm	NOMINAL PIPE SIZE inch	OUT-SIDE DIA. mm	PIPE WALL THICKNESS (mm) SCH.40	STD	SCH.80	X/STR	SCH.160	REMARKS
6	1/8	10.5	1.7	–	2.4	–	–	
8	1/4	13.8	2.2	–	3.0	–	–	
10	3/8	17.3	2.3	–	3.2	–	–	
15	1/2	21.7	2.8	–	3.7	–	4.7	
20	3/4	27.2	2.9	–	3.9	–	5.5	
25	1	34.0	3.4	–	4.5	–	6.4	
32	1 ¼	42.7	3.6	–	4.9	–	6.4	
40	1 ½	48.6	3.7	–	5.1	–	7.1	
50	2	60.5	3.9	–	5.5	–	8.7	
65	2 ½	76.3	5.2	–	7.0	–	9.5	
80	3	89.1	5.5	–	7.6	–	11.1	
90	3 ½	101.6	5.7	–	8.1	–	12.7	
100	4	114.3	6.0	–	8.6	–	13.5	
125	5	139.8	6.6	–	9.5	–	15.9	
150	6	165.2	7.1	–	11.0	–	18.2	
200	8	216.3	8.2	–	12.7		23.0	
250	10	267.4	9.3	–	15.1	12.7	28.6	
300	12	318.5	10.3	9.5	17.4	12.7	33.3	
350	14	355.6	11.1	9.5	19.0	12.7	35.7	
400	16	406.4	12.7	9.5	21.4	12.7	40.5	
450	18	457.2	14.3	9.5	23.8	12.7	45.2	
500	20	508.0	15.1	9.5	26.2	12.7	50.0	

1. In general, pipes whose thickness is ones SURROUNDED by ▭ shall be used except specially required.
2. Wall thickness of exhaust gas pipe more than 400A is 6.0 mm.

1.2.2. Copper pipes

DIMENSION TABLE (JIS STANDARD)

Nominal size mm	Nominal size Inch	Outside diam. mm	Thickness mm
4	-	6	1.0
5	1/4	8	1.0
6	-	8	1.2
8	-	10	1.0
-	-	10	1.4
10	3/8	15	1.6
10	3/8	15	1.4
15	1/2	20	1.8
20	-	25	1.8
25	1	30	2.0
32	1 1/4	35	2.0
40	1 1/2	45	2.0
50	2	55	2.3
65	2 1/2	70	2.5
80	3	85	3.0
100	4	110	3.0
100	4	110	3.5
125	5	140	3.0
125	5	140	3.5
150	6	160	3.5
150	6	160	4.0
200	8	210	4.5
250	10	270	5.0
300	12	320	6.0

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1.2.3. COPPER ALLOY PIPES

DIMENSION TABLE

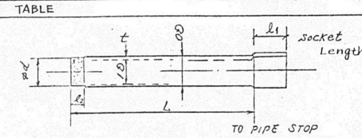
Nominal size		Copper pipe		Copper alloy pipe	
mm	Inch	Outside dia. (mm)	Thickness (mm)	Outside dia. (mm)	Thickness (mm)
4	-	6	1.0	-	-
6	1/8	8	1.2	-	-
-	-	10	1.4	-	-
10	3/8	15	1.4	-	-
15	1/2	20	1.8	15.14	1.22
20	3/4	25	1.8	21.49	1.22
25	1	30	2.0	28.24	1.42
32	1 1/4	35	2.0	34.59	1.42
40	1 1/2	45	2.0	40.95	1.42
50	2	55	2.3	54.05	1.62
65	2 1/2	70	2.5	66.75	1.62
80	3	85	3.0	79.86	1.82
100	4	110	3.0	106.27	2.33
125	5	140	3.0	131.67	2.33
150	6	160	3.5	157.68	2.64
200	8	-	-	208.48	2.64
250	10	-	-	260.50	3.25
300	12	-	-	312.12	3.66
350	14	-	-	363.73	4.06
400	16	-	-	414.53	4.06
450	18	-	-	465.33	4.06
500	20	-	-	516.94	4.47
550	22	-	-	567.74	4.47
600	24	-	-	619.35	4.87

Note: Complies with JIS H3300.

1.2.4 F.R.P. PIPES (FIBERGLASS REINFORCED PLASTIC)

DIMENSION TABLE

$50^A \sim 400^A$



TYPE: Series 2000-M

NOMI. DIA.	ID (mm)	OD (mm)	t (mini) (mm)	Spigot Dia. φd (mm)	MAX. LENGTH L (m)	ℓ1 (mm)	ℓ2 (mm)
50^A	53.1	60.2	3.56	59.2~59.6	5.5~6	46	51
80^A	81.8	88.9	3.56	87.6~88.0	↑	46	51
100^A	105.2	114.3	4.57	112.5~112.9		46	51
150^A	159.0	168.5	4.77	166.2~166.2		57	60
→ 200^A	208.8	221.0	6.11	217.0~217.4		64	67
250^A	262.9	278.0	7.56	271.3~271.7		70	73
300^A	313.7	331.5	8.9	322.2~322.6		76	79
→ IPS 350^A	337.6	356.6	9.6	354.2~354.8	↓	89	92
IPS 400^A	385.8	407.6	10.9	404.1~404.5	5.5~6	102	105

Series-7000

50^A	53.1	60.2	3.56	上記	5.5~6 m
80^A	81.8	88.9	3.56	↑	5.5~6 m
100^A	105.2	114.3	4.57		↑
150^A	159.0	168.1	4.57 ※		
200^A	208.8	220.1	5.65 ※		
250^A	262.9	277.1	7.11 ※		
300^A	313.7	330.7	8.5 ※		
IPS 350^A	337.6	355.8	9.1 ※	↓	↓
IPS 400^A	385.8	406.6	10.4 ※	上記	5.5~6

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1.3 PIPING CLASSIFICATION

1.3.1 U.S.C.G. CLASSIFICATION

TABLE 56.04-2—PRESSURE PIPING CLASSIFICATION

Service	Class [1]	Pressure (p.s.i.g.)		Temp. (°F)
Class B and C poisons [2]	I	any	and	0 and above.
	I-L	any	and	below 0.
	II	([3])	([3])	([3])
	II-L	([3])	([3])	([3])
Gases and vapors [2]	I	above 150	or	above 650.
	I-L	above 150	and	below 0.
	II	150 and below	and	0 to 650.
	II-L	150 and below	and	below 0.
Liquefied flammable gases [2]	I	above 150	and	0 and above. [1]
	I-L	above 150	and	below 0.
	II	150 and below	and	0 and above.
	II-L	150 and below	and	below 0.
Molten sulphur	I	above 225	or	above 330.
	II	225 and below	and	330 and below.
Cargo liquids Grades A through D [2]	I	above 225	or	above 150.
	I-L	above 225	and	below 0.
	II	225 and below	and	0 to 150.
	II-L	225 and below	and	below 0.
Cargo liquids Grade E	I	above 225	or	above 400.
	I-L	above 225	and	below 0.
	II	225 and below	and	0 to 400.
	II-L	225 and below	and	below 0.
Water	I	above 225	or	above 350.
	II	225 and below	and	350 and below.
Fuels (Bunker, diesel, gasoline, etc.)	I	above 150	or	above 150.
	II	150 and below	and	150 and below.
Lubricating oil	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Asphalt	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Heat transfer oil	I	above 225	or	above 400.
	II	225 and below	and	400 and below.
Hydraulic fluid	I	above 225	or	above 400.
	II	225 and below	and	400 and below.

Flammable or combustible dangerous cargoes .... Refer to specific requirements of Part 40 of this chapter.
Other dangerous cargoes .... Refer to specific requirements of Part 98 of this chapter.

[1] Where doubt exists as to proper classification, refer to the Commandant for resolution.
[2] For definitions, see 46 CFR Parts 30, 151, and 154. Note that the category "B and C" poisons is not used in the rules applying to self-propelled vessels (46 CFR Part 153).
[3] Not permitted except inside cargo tanks approved for Class B and C poisons.

1.3.2 A.B.S. CLASSIFICATION

36.1.2 Piping Groups
To distinguish between detail requirements on the various systems the piping on shipboard is divided into two groups.

GROUP I in general includes all piping intended for working pressures or temperatures in various services as follows.

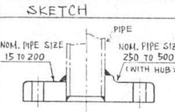
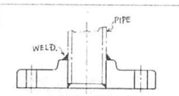
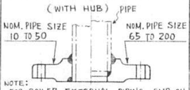
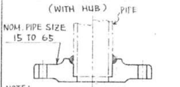
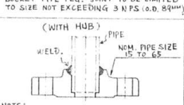
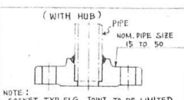
Service	Pressure kg/cm² (psi)	Temperature C(F)
Vapor and Gas	over 10.5 (150)	over 343 (650)
Water	over 15.8 (225)	over 177 (350)
Lubricating Oil	over 15.8 (225)	over 204 (400)
Fuel Oil	over 10.5 (150)	over 66 (150)
Hydraulic Fluid	over 15.8 (225)	over 204 (400)
Lethal* Gases and Liquids	all	all

*For definition of lethal gases and liquids see 30.13.3d.

GROUP II includes all piping intended for working pressures and temperatures below those stipulated under GROUP I, cargo-oil and tank-cleaning piping, and in addition such open-ended lines as drains, overflows, vents and boiler escape pipes.

2. PIPE JOINT

2.1.1. STEEL & STAINLESS STEEL FLANGES (1/2)

NAME	SKETCH	APPLICATION
JIS 10 kg/cm² SLIP-ON WELD. FLANGE	 PIPE NOM. PIPE SIZE 15 TO 200 NOM. PIPE SIZE 250 TO 500 (WITH HUB)	MATERIAL STEEL PIPE : SS 41 ··· NOM. SIZE 15 TO 200 (EQUIVALENT TO ASTM A36) SF 50A · NOM. SIZE 250 TO 500 (EQUIVALENT TO ASTM A105) STAINLESS STEEL PIPE : SUS F 304 (EQUIVALENT TO ASTM A182 GRADE F304)
JIS 16 kg/cm² SLIP-ON WELD. FLANGE	 PIPE WELD. (WITH HUB) (NOM. PIPE SIZE 10 TO 200)	MATERIAL STEEL PIPE : SF50A (EQUIVALENT TO ASTM A 105)
JIS 20 kg/cm² SLIP-ON WELD. FLANGE	(WITH HUB) PIPE  NOM. PIPE SIZE 10 TO 50 NOM. PIPE SIZE 65 TO 200 NOTE: FOR BOILER EXTERNAL PIPING, SLIP-ON FLG. TO BE LIMITED TO SIZE NOT EXCEEDING 4 NPS (O.D. 114MM).	
JIS 30 kg/cm² SOCKET WELD. FLANGE	(WITH HUB) PIPE  NOM. PIPE SIZE 15 TO 65 NOTE: SOCKET TYPE FLG. JOINT TO BE LIMITED TO SIZE NOT EXCEEDING 3 NPS (O.D. 89MM)	
JIS 40 kg/cm² SOCKET WELD. FLANGE	(WITH HUB)  PIPE WELD. NOM. PIPE SIZE 15 TO 65 NOTE: THE SAME ABOVE	MATERIAL STEEL PIPE : SF50A (EQUIVALENT TO ASTM A105) STAINLESS STEEL PIPE : SUS F 304 (EQUIVALENT TO ASTM A182 GRADE F304)
JIS 63 kg/cm² SOCKET WELD. FLANGE	(WITH HUB)  PIPE NOM. PIPE SIZE 15 TO 50 NOTE: SOCKET TYP FLG. JOINT TO BE LIMITED TO SIZE NOT EXCEEDING 2.5 NPS (O.D. 73MM)	MATERIAL STEEL PIPE : SF 50A (EQUIVALENT TO ASTM A105)

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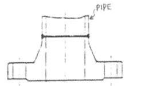
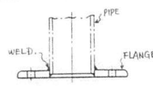
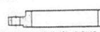
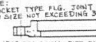
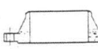
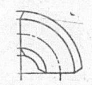
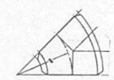
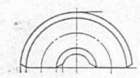
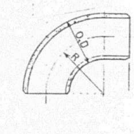
2.1.1 STEEL & STAINLESS STEEL FLANGES (2/2)

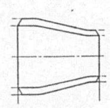
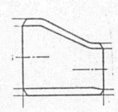
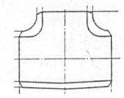
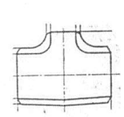
NAME	SKETCH	APPLICATION
JIS 30 kg/cm², 40 kg/cm² & 63 kg/cm² WELDING NECK FLANGES	 (WITH NECK) (JIS 30 kg/cm² : NOM. PIPE SIZE 80 TO 200; JIS 40 kg/cm² & 63 kg/cm² : NOM. PIPE SIZE 32 TO 200)	MATERIAL STEEL PIPE : SF 50 A (EQUIVALENT TO ASTM A105) STAINLESS STEEL PIPE : SUS F304 (EQUIVALENT TO ASTM A182 GRADE F304)
FLANGE FOR EXHAUST GAS PIPE	 (NOM. PIPE SIZE : 350 & OVER)	MATERIAL SF 50A (EQUIVALENT TO ASTM A105)
ANSI CLASS 150 & 300 PSI SLIP-ON WELD. FLANGES	ALL SIZE  NOTE: FOR BOILER EXTERNAL PIPING, SLIP-ON FLG. TO BE LIMITED TO SIZE NOT EXCEEDING 4 NPS (O.D. 114MM).	MATERIAL ASTM A 105
ANSI CLASS 150, 300, 600, 900 & 1500 PSI SOCKET WELD. FLANGES	150, 300 & 600 PSI : NOM. PIPE SIZE 15 TO 65 NOTE: SOCKET TYPE FLG. JOINT TO BE LIMITED TO SIZE NOT EXCEEDING 3 NPS (O.D. 89MM)  900 & 1500 PSI : NOM. PIPE SIZE 15 TO 50 NOTE: SOCKET TYPE FLG. JOINT TO BE LIMITED TO SIZE NOT EXCEEDING 2½ NPS (O.D. 73MM)	
ANSI CLASS 150, 300, 600, 900 & 1500 PSI WELD. NECK FLANGES		
ANSI CLASS 150, 300, 600, 900 & 1500 PSI BLIND FLANGES		

(DETAIL TO BE SHOWN ON THE OTHER DRAWING.)

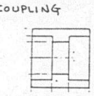
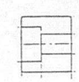
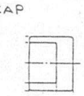
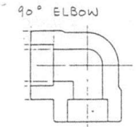
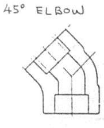
2.2. BUTT WELDING FITTING (1/2)

NAME	SKETCH	APPLICATION
90° ELBOW LONG RUDIUS & SHORT RUDIUS		MATERIAL STEEL PIPE SB 42 (NOM. DIA. 18" & ABOVE) (EQUIVALENT TO ASTM A515 GRADE 60) STPT 42 (EQUIVALENT TO ASTM A106 GRADE B) STAINLESS STEEL PIPE SUS 304 (EQUIVALENT TO ASTM A312 GRADE TP304) THICKNESS IS AS SAME AS PIPE WHICH THE FITTING IS FITTED
45° ELBOW LONG RUDIUS & SHORT RUDIUS		
180° ELBOW LONG RUDIUS & SHORT RUDIUS		BUTT WELD FITTING DIMENSIONS ARE BASED ON JIS (JIS B 2312)
90° ELBOW WITH HIGH TANGENT		EXCEPT THAT THE SHAPE OF WELDING BEVEL FOR FITTING SHALL BE MODIFIED IN ACCORDANCE WITH ANSI B16.9 AND B16.28.

2.2. (2/2)

NAME	SKETCH	APPLICATION
CONCENTRIC REDUCER		
ECCENTRIC REDUCER		
STRAIGHT TEE		
REDUCING TEE		

2.3. SOCKET WELD. FITTINGS (DETAIL TO BE SHOWN ON THE OTHER DRAWING.) (1/2)

NAME	SKETCH	APPLICATION
SOCKET WELD FITTING	COUPLING  HALF COUPLING 	STEEL PIPE MATERIAL ASTM A105 (JIS G3201 SF50A) USCG CLASS I: PIPE SIZE NOM. 65A & BELOW; USCG CLASS II: ALL
COUPLING, HALF COUPLING, CAP 90° ELBOW, 45 ELBOW, TEE AND REDUCER SHALL BE IN ACCORDANCE WITH JIS (JIS B 2316)	CAP  90° ELBOW  45° ELBOW 	ALLOWABLE PRESSURE JIS 210 kg/cm² (ANSI 3000 LBS) STAINLESS STEEL PIPE ASTM A 182 GRADE F 304 (JIS G 3214 SUS F304) USCG CLASS I: PIPE SIZE NOM. 65A & BELOW; USCG CLASS II: ALL ALLOWABLE PRESSURE JIS 210 kg/cm² (ANSI 3000 LBS)

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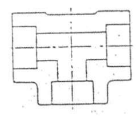
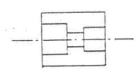
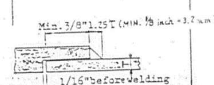
2.3.1 SOCKET WELDING FITTING (2/2)

NAME	SKETCH	APPLICATION
	TEE  REDUCER  WELDING DETAIL 	

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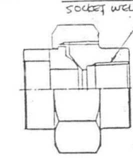
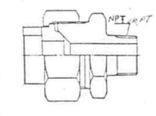
2.3.2 UNION JOINT

NAME	SKETCH	APPLICATION
UNION JOINT	UNION  NIPPLED UNION  DIMENSIONS OF UNION AND NIPPLED UNION SHALL BE IN ACCORDANCE WITH MSS-SP83 EXCEPT THAT SOCKET WELD BORE AND WATER WAY BORE ARE MODIFIED SO AS TO SUIT TO JIS PIPE SIZE AND ALSO NIPPLE PART ARE MODIFIED FROM MSS-SP83.	SOCKET WELD USCG CLASS I --- NOMI. PIPE SIZE : 65A & BELOW USCG CLASS II --- ALL PIPE SIZE THREAD SCREWED FITTINGS MAY BE USED IN GROUP I PIPING SYSTEMS IN TEMPERATURES NOT EXCEEDING 492°C (925°F) AND PRESSURES AS FOLLOWS : NOMI. SIZE — MAX. PRESS. ABOVE 2" --- NOT PERMITTED IN GROUP I PIPING SERVICE ABOVE 1" TO 2" --- 600 psi ABOVE 3/4" TO 1" --- 1200 psi 3/4" AND BELOW --- 1500 psi STEAM SERVICE ≦ 150 psi WATER SERVICE ≦ 100 psi & 200°F IN HYDRAULIC PIPING SYSTEMS (OTHER THAN STEERING GEAR SYSTEMS), SCREWED FITTINGS MAY BE USED WITHOUT SIZE LIMITATIONS WHEN SUPPLIED AS PART OF A MANUFACTURED UNIT AND WHEN THEY DO NOT FORM PART OF THE SHIP'S PIPING SYSTEM.

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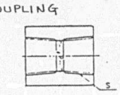
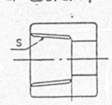
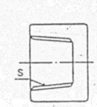
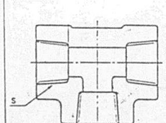
2.4. SCREWED JOINT (DETAIL TO BE SHOWN ON THE OTHER DRAWING.) (1/2)

NAME	SKETCH	APPLICATION
SCREWED JOINT COUPLING, HALF COUPLING, CAP TEE, 90° ELBOW, 45° ELBOW OF SCREWED JOINT SHALL BE IN ACCORDANCE WITH JIS (JIS B2316) ALL FITTING DIMENSIONS BASED ON JIS B2316 ARE BASICALLY IN COMPLIANCE WITH THOSE LISTED IN ANSI B.16.11.	COUPLING  HALF COUPLING  CAP  TEE 	STEEL PIPE MATERIAL ASTM A105 (JIS G3201 SF50A) THESE TYPE OF COUPLING SHALL BE USED ONLY TO THE PIPING WHOSE OUT DIA. IS BELOW 60.3 M/M. ALLOWABLE PRESSURE JIS 210 kg/cm² (ANSI 3000 LBS) APPLICATION SCREWED FITTINGS MAY BE USED IN GROUP I PIPING SYSTEMS IN TEMPERATURES NOT EXCEEDING 492°C (925°F) AND PRESSURES AS FOLLOWS : NOMI. SIZE — MAX. PRESS. ABOVE 2" --- NOT PERMITTED IN GROUP I PIPING SERVICE ABOVE 1" TO 2" --- 600 psi ABOVE 3/4" TO 1" --- 1200 psi 3/4" AND BELOW --- 1500 psi IN HYDRAULIC PIPING SYSTEMS (OTHER THAN STEERING GEAR SYSTEMS), SCREWED FITTINGS MAY BE USED WITHOUT SIZE LIMITATIONS WHEN SUPPLIED AS PART OF A MANUFACTURED UNIT AND WHEN THEY DO NOT FORM PART OF THE SHIP'S PIPING SYSTEM. STEAM SERVICE ≦ 150 psi WATER SERVICE ≦ 100 psi & 200°F

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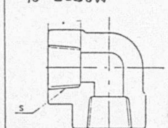
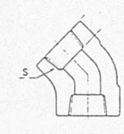
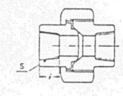
2.4 (2/2)

NAME	SKETCH	APPLICATION
	90° ELBOW  45° ELBOW  SCREWED UNION 	DIMENSIONS OF SCREWED UNION SHALL BE IN ACCORDANCE WITH MSS-SP83.

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2.5. SLEEVE WELDED JOINT FOR STEEL PIPE

1) MATERIAL ;

ASTM A 106 Gr.A (JIS G3455 STS 38 S)
ASTM A 134 (A285A)
ASTM A 515 GR.60 (JIS G 3103 SB 42)

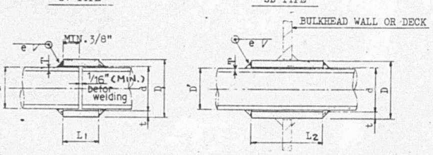
2) APPLICATION

USCG CLASS I	THICKNESS BELOW 3/8" & NOM. DIA. 3" AND BELOW
USCG CLASS II	ALL

3) DIMENSION

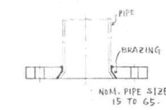
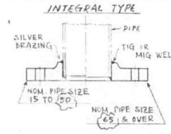
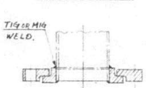
NOMINAL DIA mm	NOMINAL INCH	D' mm	D mm	t mm	d mm	SV TYPE L1 mm	SD TYPE L2 mm
15	1/2	21.7	34.0	4.5	25.0	50	100
20	3/4	27.2	42.7	6.4	29.9	50	100
25	1	34.0	48.6	6.2	36.2	50	100
32	1 1/4	42.7	60.5	7.5	45.5	50	100
40	1 1/2	48.6	65.0	7.0	51.0	50	100
50	2	60.5	76.3	7.0	62.3	50	100
65	2 1/2	76.3	101.6	11.0	79.6	80	150
80	3	89.1	114.3	11.1	92.1	80	150
100	4	114.3	139.8	11.0	117.8	100	150
125	5	139.8	168.3	13.0	142.3	100	150
150	6	165.2	198.0	15.0	168.0	150	200
200	8	216.3	259.0	20.0	219.0	150	200
250	10	267.4	310.0	20.0	270.0	150	200
300	12	318.5	365.2	22.0	321.6	150	200
350	14	355.6	391.6	16.0	359.6	150	200
400	16	406.4	442.4	16.0	410.4	150	200
450	18	457.2	497.2	18.0	461.2	150	200
500	20	508.0	550.0	19.0	512.0	150	200
600	24	609.6	645.6	16.0	613.6	150	200

SV TYPE SD TYPE

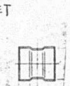
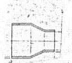
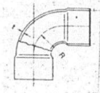
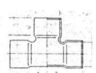
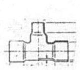


e : 1.25 × T BUT NOT LESS THAN 1/8" (3.2 mm)

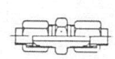
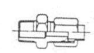
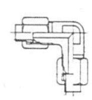
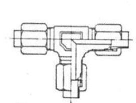
2.7. COPPER & COPPER ALLOY PIPE FLANGES

NAME	SKETCH	APPLICATION
JIS 10 kg/cm² COPPER PIPE FLANGE		MATERIAL BC 7 (EQUIVALENT TO ASTM B61)
JIS 10 kg/cm² COPPER NICKEL PIPE FLANGE	INTEGRAL TYPE 	SIZE 15A TO 50A MATERIAL BC 7 (EQUIVALENT TO ASTM B61)
		SIZE 65A AND OVER MATERIAL ASTEM B148-954
	COMPOSITE TYPE  65A & OVER (MAINLY USED)	SIZE 65A AND OVER INNER FLANGE ASTM B148-954 OUTER FLANGE 65A ~ 150A SS41 (EQUIVALENT TO ASTM A36) 200A ~ 500A SF 50A (EQUIVALENT TO ASTM A105)

2.8. WROUGHT COPPER (AND COPPER ALLOY) BRAZED FITTINGS

NAME	SKETCH	APPLICATION
	SOCKET  REDUCING SOCKET  ELBOW  TEE  REDUCING TEE 	COPPER & COPPER ALLOY PIPE MATERIAL COPPER : JIS H 3300, C1220T (EQUIV. TO ASTM B88, C12200, TYPE K) COPPER ALLOY : ASTM B466, C70600 RATING : ~ MAX WORKING PRESS. 142 psi (10 kg/cm²) MAX WORKING TEMP. 352°F (178°C)

2.9. FLARE JOINT FOR COPPER

NAME	SKETCH	APPLICATION
UNION		MATERIAL • ASTM B62 • JIS H 3250 C3604 (EQUIV. TO ASTM B16, C36000 OR ASTM B124 C37700) • JIS H 3250 C4641B (EQUIV. TO ASTM B21, C46400 OR ASTM B124 C46400)
MALE CONNECTOR		
ELBOW		
TEE		APPLICATION NOM. DIA. 6 TO 15

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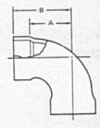
2.10. JOINT FOR F.R.P. PIPE (1/4)

Filament-Wound Quick-Lock Fittings

Bondstrand filament-wound fittings are made using continuous glass fiber and thermosetting resin to form a strong, resilient fitting body. A reinforced resin layer completely and continuously covers the bore surface of lined fittings, providing extra corrosion and abrasion resistance.

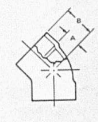
Elbow 90 Degree Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150° (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to End B in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34069	34100	34198	3 (76)	4 13/16 (122)	1 13/16 (46)	1.1 (0.5)
3 (80)	34070	--	34199	4 1/2 (114)	6 5/16 (160)	1 13/16 (46)	2.4 (1.1)
4 (100)	34071	--	34200	6 (152)	7 13/16 (198)	1 13/16 (46)	3.5 (1.6)
6 (150)	34072	--	34201	9 (229)	11 1/4 (286)	2 1/4 (57)	7.9 (3.6)
8 (200)	34073	--	34202	12 (305)	14 1/2 (368)	2 1/2 (64)	15 (6.8)
10 (250)	34074	--	34203	15 (381)	17 3/4 (451)	2 3/4 (70)	25 (11)
12 (300)	34075	--	34204	18 (457)	21 (533)	3 (76)	41 (18)
14 (350)	34358	--	34376	14 1/8 (359)	17 5/8 (448)	3 1/2 (89)	37 (26)
16 (400)	34359	--	34377	15 5/8 (397)	19 5/8 (498)	4 (108)	68 (31)



Elbow 45 Degree Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

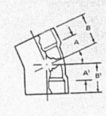
Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to End B in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34009	34101	34205	1 3/8 (35)	3 3/16 (81)	1 13/16 (46)	0.9 (0.4)
3 (80)	34010	--	34206	2 (51)	3 13/16 (97)	1 13/16 (46)	1.7 (0.8)
4 (100)	34011	--	34207	2 1/2 (64)	4 5/16 (110)	1 13/16 (46)	2.5 (1.1)
6 (150)	34012	--	34208	3 3/4 (95)	6 (152)	2 1/4 (57)	5.2 (2.4)
8 (200)	34013	--	34209	5 (127)	7 1/2 (191)	2 1/2 (64)	9.3 (4.2)
10 (250)	34014	--	34210	6 1/4 (159)	9 (229)	2 3/4 (70)	16 (7.3)
12 (300)	34015	--	34211	7 1/2 (191)	10 1/2 (267)	3 (76)	26 (11)
14 (350)	34360	--	34378	4 3/4 (120)	8 1/4 (210)	3 1/2 (89)	38 (17)
16 (400)	34361	--	34379	5 3/8 (136)	9 3/8 (238)	4 (102)	45 (20)



Elbow 22.5 Degree (Special Angle) Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to Pipe Stop A' in. (mm)	Center to End B in. (mm)	Center to End B' in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34112	34105	34212	1 (26)	1/2 (12)	2 7/8 (72)	2 1/8 (54)	1 13/16 (46)	0.7 (0.3)
3 (80)	34113	--	34213	1 1/4 (30)	3/4 (18)	3 (78)	2 1/2 (64)	1 13/16 (46)	1.3 (0.6)
4 (100)	34114	--	34214	3/4 (18)	--	2 1/2 (64)	--	1 13/16 (46)	3.3 (1.5)
6 (150)	34115	--	34215	1 1/8 (28)	--	3 3/8 (86)	--	2 1/4 (57)	3.9 (1.8)
8 (200)	34116	--	34216	2 1/8 (54)	--	4 5/8 (117)	--	2 1/2 (64)	12 (5.4)
10 (250)	34117	--	34217	2 5/8 (67)	--	5 3/8 (137)	--	2 3/4 (70)	19 (8.6)
12 (300)	34118	--	34218	3 (76)	--	6 (152)	--	3 (76)	29 (13)

Note: Special angle elbows are made to order and can be supplied to any specified angle from about 15 degrees to 85 degrees.



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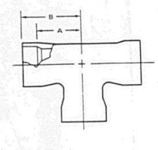
2.10. (2/4)

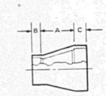
Tee Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to End B in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34016	34102	34219	2 1/2 (64)	4 5/16 (110)	1 13/16 (46)	2.1 (1.0)
3 (80)	34017	--	34220	3 3/8 (86)	5 3/16 (132)	1 13/16 (46)	4.1 (1.9)
4 (100)	34018	--	34221	4 1/8 (105)	5 15/16 (151)	1 13/16 (46)	5.0 (2.3)
6 (150)	34019	--	34222	5 5/8 (143)	7 7/8 (200)	2 1/4 (57)	11 (5.0)
8 (200)	34020	--	34223	7 (178)	9 1/2 (241)	2 1/2 (64)	18 (8.2)
10 (250)	34021	--	34224	8 1/2 (216)	11 1/4 (286)	2 3/4 (70)	32 (14)
12 (300)	34022	--	34225	10 (254)	13 (330)	3 (76)	46 (20)
14 (350)	34362	--	34380	10 1/2 (267)	14 (356)	3 1/2 (89)	65 (29)
16 (400)	34320	--	34381	11 1/2 (292)	15 1/2 (394)	4 (102)	97 (44)



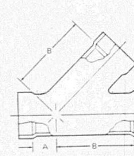
Reducer Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) –150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	7000 (Epoxy)	Pipe Stop to Pipe Stop A in. (mm)	Socket Depth B in. (mm)	Socket Depth C in. (mm)	Approx. Weight lbs (kg)
3 × 2 (80 × 50)	34023	34226	2 1/8 (54)	1 13/16 (46)	1 13/16 (46)	1.4 (0.6)
4 × 2 (100 × 50)	34024	34227	3 (76)	1 13/16 (46)	1 13/16 (46)	2.1 (1.0)
4 × 3 (100 × 80)	34025	34228	2 7/8 (73)	1 13/16 (46)	1 13/16 (46)	2.2 (1.0)
6 × 3 (150 × 80)	34026	34229	3 13/16 (97)	1 13/16 (46)	2 1/4 (57)	3.9 (1.8)
6 × 4 (150 × 100)	34027	34230	3 11/16 (94)	1 13/16 (46)	2 1/4 (57)	3.5 (1.6)
8 × 4 (200 × 100)	34028	34231	5 7/16 (138)	1 13/16 (46)	2 1/2 (64)	7.1 (3.2)
8 × 6 (200 × 150)	34029	34232	3 7/8 (98)	2 1/4 (57)	2 1/2 (64)	6.6 (3.0)
10 × 6 (250 × 150)	34030	34233	4 5/8 (117)	2 1/4 (57)	2 3/4 (70)	8.4 (3.8)
10 × 8 (250 × 200)	34031	34234	4 1/8 (105)	2 1/2 (64)	2 3/4 (70)	7.6 (3.4)
12 × 8 (300 × 200)	34032	34235	5 7/8 (149)	2 1/2 (64)	3 (76)	14 (6.4)
12 × 10 (300 × 250)	34033	34236	5 3/8 (137)	2 3/4 (70)	3 (76)	13 (5.9)
14 × 10 (350 × 250)	34372	34392	16 5/8 (422)	2 3/4 (70)	3 1/2 (89)	36 (16)
14 × 12 (350 × 300)	34373	34393	16 5/8 (422)	3 (76)	3 1/2 (89)	37 (17)
16 × 12 (400 × 300)	34374	34394	18 5/8 (473)	3 (76)	4 (102)	54 (24)
16 × 14 (400 × 350)	34375	34395	18 7/8 (479)	3 1/2 (89)	4 (102)	57 (26)



Lateral 45 Degree Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop Short A in. (mm)	Center to Pipe Stop Long B in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34034	34103	34327	2 1/2 (64)	8 (203)	1 13/16 (46)	3.6 (1.6)
3 (80)	34035	--	34328	3 (76)	10 (254)	1 13/16 (46)	6.6 (3.0)
4 (100)	34036	--	34329	3 (76)	12 (305)	1 13/16 (46)	8.7 (3.9)
6 (150)	34037	--	34330	3 1/2 (89)	14 1/2 (368)	2 1/4 (57)	15 (6.8)
8 (200)	34038	--	34331	4 1/2 (114)	17 1/2 (445)	2 1/2 (64)	27 (12)
10 (250)	34039	--	34332	5 (127)	20 1/2 (521)	2 3/4 (70)	47 (21)
12 (300)	34040	--	34333	5 1/2 (140)	24 1/2 (622)	3 (76)	67 (30)



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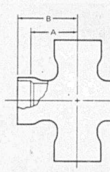
2.10. (3/4)

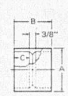
Cross Filament-Wound Quick-Lock

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to End B in. (mm)	Socket Depth in (mm)	Rated Hydrostatic Pressure at 150°F (66°C) psi (bar)	Approx. Weight lbs (kg)
2 (50)	34041	34104	34334	2 1/2 (64)	4 5/16 (110)	1 13/16 (46)	150 (10)	2.8 (1.3)
3 (80)	34042	--	34335	3 3/8 (86)	5 3/16 (132)	1 13/16 (46)	150 (10)	5.5 (2.5)
4 (100)	34043	--	34336	4 1/8 (105)	5 15/16 (151)	1 13/16 (46)	150 (10)	7.0 (3.2)
6 (150)	34044	--	34337	5 5/8 (143)	7 7/8 (200)	2 1/4 (57)	150 (10)	13 (5.9)
8 (200)	34045	--	34338	7 (178)	9 1/2 (241)	2 1/2 (64)	100 (6.8)	23 (10)
10 (250)	34046	--	34339	8 1/2 (216)	11 1/4 (286)	2 3/4 (70)	100 (6.8)	37 (16)
12 (300)	34047	--	34340	10 (254)	13 (330)	3 (76)	100 (6.8)	61 (27)
14 (350)	34369	--	34390	10 1/2 (267)	14 (356)	3 1/2 (89)		69 (31)
16 (400)	34370	--	34391	11 1/2 (292)	15 1/2 (394)	4 (102)		103 (47)



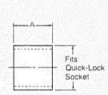
Coupling Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Outside Dia. A in. (mm)	Overall Length B in. (mm)	Socket Depth C in. (mm)	Approx. Weight lbs (kg)
2 (50)	34048	34098	34251	2 13/16 (71)	4 (102)	1 13/16 (46)	0.6 (0.3)
3 (80)	34049	--	34252	3 15/16 (100)	4 (102)	1 13/16 (46)	0.9 (0.4)
4 (100)	34050	--	34253	5 1/16 (129)	4 (102)	1 13/16 (46)	1.4 (0.6)
6 (150)	34051	--	34254	7 3/16 (183)	4 7/8 (124)	2 1/4 (57)	2.4 (1.1)
8 (200)	34052	--	34255	9 1/4 (235)	5 3/8 (137)	2 1/2 (64)	3.8 (1.7)
10 (250)	34053	--	34256	11 3/8 (289)	5 7/8 (149)	2 3/4 (70)	5.2 (2.4)
12 (300)	34054	--	34257	13 3/8 (340)	6 3/8 (162)	3 (76)	7.0 (3.2)
14 (350)	34363	--	34382	14 11/16 (398)	7 3/4 (197)	3 1/2 (89)	12 (5.4)
16 (400)	34319	--	34383	16 15/16 (430)	8 3/4 (222)	4 (102)	14 (6.4)



Nipple Filament-Wound
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

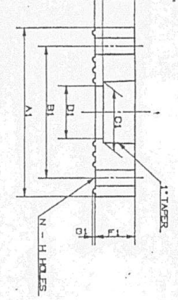
Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Nipple Length A in. (mm)	Approx. Weight lbs (kg)
2 (50)	34055	34099	34258	3 3/4 (95)	0.2 (0.1)
3 (80)	34056	--	34259	3 3/4 (95)	0.3 (0.1)
4 (100)	34057	--	34260	3 3/4 (95)	0.5 (0.2)
6 (150)	34058	--	34261	4 5/8 (117)	0.9 (0.4)
8 (200)	34059	--	34262	5 1/8 (130)	1.4 (0.6)
10 (250)	34060	--	34263	5 5/8 (143)	1.9 (0.9)
12 (300)	34061	--	34264	6 1/8 (156)	2.4 (1.1)
14 (350)	34364	--	34384	7 1/4 (184)	6.7 (3.1)
16 (400)	34322	--	34385	8 1/4 (260)	9.7 (4.4)



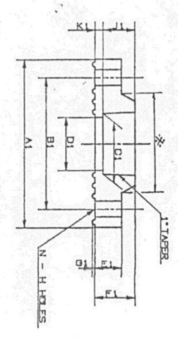
32/69

FLANGE JIS10K (4/4)

TYPE "A"



TYPE "B"



NOM. SIZE (A)	TYPE	A1	B1	C1	D1	E1	F1	G1	J1	K1	N - H	TOLERANCE A1	B1	C1	F1	K1	※
50	A	155	120	59.9	54		50	1.2	46.5	3.2	4-19	±1.5	±0.8	±0.3	±1.6	±0.8	
80		185	150	88.3	83		50	1.2	46.5	3.2	8-19						
100		210	175	113.2	108		50	1.2	46.5	3.2	8-19						
150		280	240	166.9	159		60	1.2	57.0	3.2	8-23						
200 (三井造船 LYKES)		330	290	217.7	209		67	1.2	64.0	3.2	12-23						
250		400	355	272.0	263		73	1.5	70.0	3.2	12-25						
300		445	400	322.8	314		79	1.5	76.0	3.2	16-25						
350 (三井造船 LYKES)	B	490	445	354.5	337	69	95	1.5	89.0	6.4	16-25						
400																	
450																	
500																	
550																	
600																	
650																	
700																	
750																	
800																	
850																	
900																	

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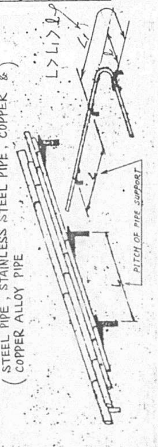
3. PIPE SUPPORT AND BAND

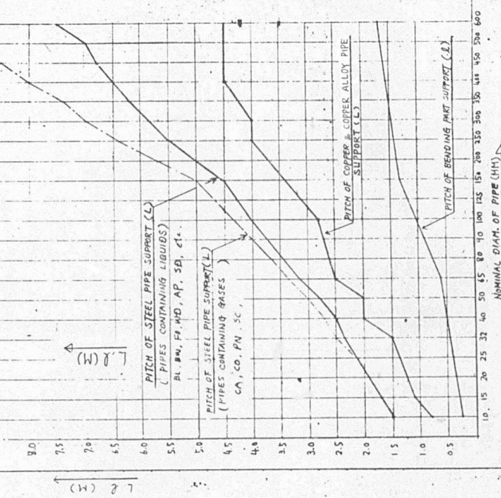
3.1 APPLICATION OF PIPE SUPPORT & BAND

COMPARTMENT / PIPE MATERIAL	IN TANK (EXCEPT F.O. TK.)	IN F.O.TK.	WEATHER PART	IN MACHINERY RM. & OTHER SPACE	ACCOMMODATION
STEEL PIPE & STAINLESS STEEL PIPE	SUPPORT: STEEL ANGLE BAR OR STEEL FLAT BAR (GALVANIZED) BAND: STEEL U-BOLT & NUT OR STEEL FLAT BAR (GALVANIZED)	SUPPORT: STEEL ANGLE BAR OR STEEL FLAT BAR (NOT GALVANIZED) BAND: STEEL U-BOLT & NUT OR STEEL FLAT BAR (NOT GALVANIZED)	SUPPORT: STEEL ANGLE BAR OR STEEL FLAT BAR (GALVANIZED) BAND: SAME AS RIGHT	SUPPORT: STEEL ANGLE BAR OR STEEL FLAT BAR (NOT GALVANIZED) BAND: STEEL U-BOLT & NUT OR STEEL FLAT BAR (NOT GALVANIZED)	SUPPORT: STEEL ANGLE BAR OR STEEL FLAT BAR (NOT GALVANIZED) BAND: STEEL U-BOLT & NUT OR STEEL FLAT BAR (GALVANIZED)
COPPER & COPPER ALLOY PIPE	—	—	—	SUPPORT: STEEL ANGLE BAR OR STEEL FLAT BAR (NOT GALVANIZED) BAND: LEAD LINED STEEL FLAT BAR OR BRASS BAND & BRASS SHEET	SUPPORT: STEEL ANGLE BAR OR STEEL FLAT BAR (NOT GALVANIZED) BAND: SAME AS LEFT
F.R.P. PIPE	SUPPORT: STEEL ANGLE BAR OR STEEL FLAT BAR (GALVANIZED) BAND: STEEL FLAT BAR (GALVANIZED) WITH NEOPRENE SHEET	—	—	—	—

3.2.1. STANDARD SPANCING FOR PIPE SUPPORT

(STEEL PIPE, STAINLESS STEEL PIPE, COPPER & COPPER ALLOY PIPE)





3.2.2. STANDARD SPANCING FOR PIPE SUPPORT

(FOR F.R.P. PIPE)

Approvals

The following classification societies and regulatory agencies have accepted Series 2000-M pipe for specific shipboard applications:
United States Coast Guard
American Bureau of Shipping
Lloyd's Registry of Shipping
Det Norske Veritas
Bureau Veritas
Germanischer Lloyd's
Dutch Scheepvaartinspectie
Registro Italiano Navale
Nippon Kaiji Kyokai

Guidance for Proper Assembly

The Quick-Lock joints on most Series 2000-M piping installations are bonded using Bondstrand RP-34 epoxy adhesives. Complete assembly instructions for bonded joints are found in Bondstrand Assembly Instructions—RP-34 Epoxy Adhesive, BA-6. Similar information covering assembly of flanges and mechanical joints is also available from Ameron.

Table 4
Recommended Maximum Support Spacings for Pipe at 100°F and 150°F Operating Temperatures
(fluid specific gravity = 1.0)

Nominal Diameter (in.)	Nominal Diameter (mm)	Uniform Load Pipe lb/in	Uniform Load Pipe kg/m	Uniform Load Fluid lb/in	Uniform Load Fluid kg/m	Continuous Joints[3] @ 100°F (38°C) ft	Continuous Joints[3] @ 100°F (38°C) m	Continuous Joints[3] @ 150°F (66°C) ft	Continuous Joints[3] @ 150°F (66°C) m	Mechanical Joints[4] @ 100°F (38°C) ft	Mechanical Joints[4] @ 100°F (38°C) m	Mechanical Joints[4] @ 150°F (66°C) ft	Mechanical Joints[4] @ 150°F (66°C) m
2	50	0.07	1.2	0.13	2.2	11.8	3.6	11.2	3.4	9.5	2.9	9.0	2.7
3	80	0.10	1.9	0.29	5.3	13.6	4.1	12.8	3.9	10.9	3.3	10.3	3.1
4	100	0.17	3.0	0.48	8.7	15.4	4.7	14.6	4.4	12.4	3.8	11.7	3.6
6	150	0.26	4.6	1.1	20.	17.5	5.3	16.5	5.0	14.0	4.3	13.2	4.0
→ 8	200	0.43	7.8	1.9	34.	20.0	6.1	18.9	5.8	16.0	4.9	15.1	4.6
10	250	0.68	12.	3.0	54.	22.4	6.8	21.2	6.5	18.0	5.5	17.0	5.2
12	300	0.95	17.	4.3	77.	24.4	7.4	23.0	7.0	19.5	6.0	18.5	5.6
→ 14	350	1.1	20.	5.1	89.	25.	7.7	24.	7.2	20.	6.1	19.1	5.8
16	400	1.4	25.	6.8	117.	27.	8.2	25.	7.7	20.	6.1	20.	6.1
18	450	1.7	32.	8.3	148.	29.	8.7	27.	8.3	20.	6.1	20.	6.1
20	500	2.2	39.	10.2	182.	30.	9.2	28.	8.7	20.	6.1	20.	6.1
22	550	2.6	47.	12.4	221.	31.	9.6	30.	9.1	20.	6.1	20.	6.1
24	600	3.1	56.	14.7	263.	33.	10.	31.	9.5	20.	6.1	20.	6.1
26	650	3.7	65.	17.3	309.	33.	10.	32.	9.9	20.	6.1	20.	6.1
28	700	4.2	75.	20.0	358.	33.	10.	32.	10.	20.	6.1	20.	6.1
30	750	4.8	86.	23.0	411.	33.	10.	33.	10.	20.	6.1	20.	6.1
32	800	5.5	98.	26.2	467.	33.	10.	33.	10.	20.	6.1	20.	6.1
34	850	6.2	110.	29.6	527.	33.	10.	33.	10.	20.	6.1	20.	6.1
36	900	6.9	123.	33.1	591.	33.	10.	33.	10.	20.	6.1	20.	6.

Notes
(1) For 14- through 36-inch diameters, loads tabulated are for iron pipe size and are 7 to 12 percent less than for metric cast iron sizes. However, recommended spans are suitable for either series of sizes.
(2) Span recommendations apply to normal horizontal piping support arrangements and are calculated for a maximum long-time deflection of ½ inch to ensure good appearance and adequate drainage.
(3) Includes Quick-Lock adhesive bonded joints and butt-and-wrap joints.
(4) Maximum spans for mechanically joined pipe are limited to one pipe length.
(5) Modulus of elasticity for span calculations: 2,100,000 (psi) − 6000 (psi/°F) x T (°F)

3.3. SCANTLING OF PIPE SUPPORT (1/2)

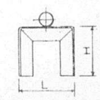
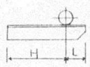
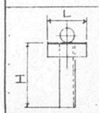
MES STANDARD

TYPE OF SUPPORT	NAME	MATERIAL	15	20	25	32	40	50	65	80	90	100	125	150	175	200	250	300	350	400	450	500	550	600	650	700
	L		88	94	100	110	124	136	154	166	198	212	238	264	290	336	388	460	496	548	631	683	733	816	866	918
	H		H ≦ 500 (NO BRACKET) H > 500 WITH STAY													H ≦ 800 (NO BRACKET)										
	SUPPORT	STEEL ANGLE	40 × 40 × 5 L										50 × 50 × 6 L			65 × 65 × 8 L		75 × 75 × 9 L			90 × 90 × 10 L			100 × 100 × 10 L		
	U-BOLT & NUT	STEEL BAR	10φ						12φ				16φ			20φ		24φ			30φ			36φ		
	L		39	42	45	50	55	61	71	77	83	98	111	124	137											
	H		H ≦ 500 (NO BRACKET) H > 500 WITH STAY																							
	SUPPORT	STEEL ANGLE	40 × 40 × 5 L										50 × 50 × 6 L													
	U-BOLT & NUT	STEEL BAR	10φ						12φ				16φ													
	L		78	84	90	100	110	122	142	154	166	196	222	248	274											
	H		H ≦ 500 (NO BRACKET) H > 500 WITH STAY																							
	SUPPORT	STEEL ANGLE	40 × 40 × 5 L										50 × 50 × 6 L													
	U-BOLT & NUT	STEEL BAR	10φ						12φ				16φ													

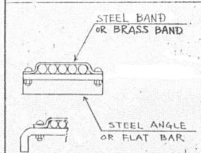
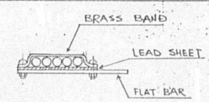
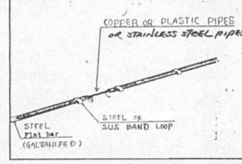
(Columns 15–700: NOMINAL DIA. OF PIPE)

3.4. SCANTLING OF PIPE SUPPORT (1/2)
(INSIDE CEILING IN ACCOMMODATION)

MES STANDARD

TYPE OF SUPPORT	NAME	MATERIAL	NOMINAL DIA. OF PIPE																							
			15	20	25	32	40	50	65	80	90	100	125	150	175	200	250	300	350	400	450	500	550	600	650	700
	L		88	94	100	110	124	136	154	166	178	212	238	264	290	336	388	460	496	548	631	683	733	816	866	918
	H		H≦1000 (NO. BRACKET) H>1000 WITH STAY																							
	SUPPORT	STEEL ANGLE	40×40×5 L									50×50×6 L				65×65×8L		75×75×9L			90×90×10L			100×100×10L		
	U-BOLT & NUT	STEEL BAR	10φ						12φ			16φ				20φ		24φ			30φ			36φ		
	L		39	42	45	50	55	61	71	77	83	98	111	124	137											
	H	-	H≦800 (NO BRACKET) H>800 WITH STAY																							
	SUPPORT	STEEL ANGLE	40×40×5 L									50×50× L														
	U-BOLT & NUT	STEEL BAR	10φ						12φ			16φ														
	L		78	84	90	100	110	122	142	154	166	196	222	248	274											
	H		H≦1000 (NO BRACKET) H>1000 WITH STAY																							
	SUPPORT	STEEL ANGLE	40×40×5 L									50×50×6L														
	U-BOLT & NUT	STEEL BAR	10φ						12φ			16φ														

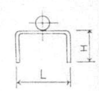
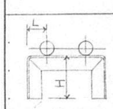
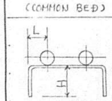
3.5. PIPE SUPPORT FOR INSTRUMENT PIPE

SKETCH	TYPE	NOMINAL DIA.	APPLIED PIPE	APPLIED PIPE SYSTEM
	SUPPORT STEEL ANGLE OR FLAT BAR BAND STEEL BAND OR BRASS BAND	$6^A - 15^A$	STEEL PIPE & STAINLESS STEEL PIPE	INSTRUMENT LINE
	SUPPORT FLAT BAR BAND BRASS BAND WITH LEAD SHEET	$6^A - 15^A$	COPPER PIPE	INSTRUMENT LINE
	SUPPORT FLAT BAR BAND STAINLESS STEEL BAND (EXPOSE PART) OR STEEL BAND (OTHER SPACE) AND BUCKLE WITH LEAD PLATE	$6^A - 15^A$	STEEL PIPE & COPPER PIPE	INSTRUMENT LINE

NOTE: SUPPORT AT WEATHER PART SHALL BE GALVANIZED. OTHERS SHALL BE PAINTED.

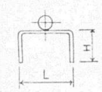
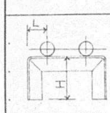
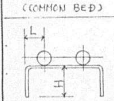
3.3. SCANTLING OF PIPE SUPPORT (2/2)

MES STANDARD

TYPE OF SUPPORT	NAME	MATERIAL	NOMINAL DIA. OF PIPE																							
			15	20	25	32	40	50	65	80	90	100	125	150	175	200	250	300	350	400	450	500	550	600	650	700
	L		89	95	101	111	124	136	156	168	180	213	239	265	292											
	H		H ≦ 100				H ≦ 150					H ≦ 200														
	SUPPORT	STEEL FLAT BAR	38×6						50×6			50×9														
	U-BOLT & NUT	STEEL BAR	10φ						12φ			16φ														
 (COMMON BED)	L		44	47	50	55	62	68	77	83	89	106	119	132	145	168	194	230	248	274	316	342	367	408	433	459
	H		H≦500 (NO BRACKET) H>500 WITH STAY													H ≦ 800 (NO BRACKET)										
	SUPPORT	STEEL ANGLE	40×40×5 L						50×50×6L			65×65×8 L				75×75×9L		90×90×10L			100×100×10L			130×130×12L		
	U-BOLT & NUT	STEEL BAR	10φ						12φ			16φ				20φ		24φ			30φ			36φ		
 (COMMON BED)	L		45	48	51	56	62	68	78	84	90	107	120	133	146											
	H		H ≦ 100				H ≦ 150					H ≦ 200														
	SUPPORT		38×6						50×6			50×9														
	U-BOLT & NUT	STEEL BAR	10φ						12φ			16φ														

3.4. SCANTLING OF PIPE SUPPORT (2/2)
(INSIDE CEILING IN ACCOMMODATION)

MES STANDARD

TYPE OF SUPPORT	NAME	MATERIAL	NOMINAL DIA. OF PIPE																							
			15	20	25	32	40	50	65	80	90	100	125	150	175	200	250	300	350	400	450	500	550	600	650	700
	L		89	95	101	111	124	136	156	168	180	213	239	265	292											
	H		H ≦ 100				H ≦ 150					H ≦ 200														
	SUPPORT	STEEL FLAT BAR	38×6						50×6			50×9														
	U-BOLT & NUT	STEEL BAR	10φ						12φ			16φ														
 (COMMON BED)	L		44	47	50	55	62	68	77	83	89	106	119	132	145	168	194	230	248	274	316	342	367	408	433	459
	H		H≦1000 (NO BRACKET) H>1000 WITH STAY																							
	SUPPORT	STEEL ANGLE	40×40×5 L						50×50×6L			65×65×8 L				75×75×9L		90×90×10L			100×100×10L			130×130×12L		
	U-BOLT & NUT	STEEL BAR	10φ						12φ			16φ				20φ		24φ			30φ			36φ		
 (COMMON BED)	L		45	48	51	56	62	68	78	84	90	107	120	133	146											
	H		H ≦ 100				H ≦ 150					H ≦ 200														
	SUPPORT		38×6						50×6			50×9														
	U-BOLT & NUT	STEEL BAR	10φ						12φ			16φ														

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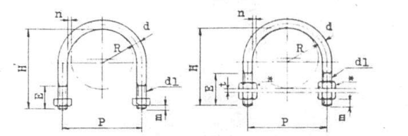
3.6. BAND AND U-BOLT

1) U-BOLT FOR PIPE OF 15mm NOMINAL DIA. AND ABOVE

50mm NOMINAL DIA AND BELOW   65mm NOMINAL DIA AND ABOVE

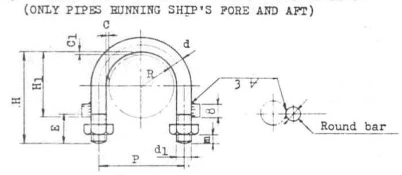


* MARKED NUTS SHALL NOT BE FITTED IN ACCOMMODATION AND ENGINE ROOM EXCEPT FOR A LARGER EXHAUST GAS PIPING.

UNIT = mm

NOMINAL DIA	OUT DIA	U-BOLT R	d	d1	H	E	ℓ	NUT NOML	QUANT.	m (3-PITCH)	n	P	t
15	21.7	12	10	M10	39.2	20	107.2	M10	2	4.5	0.65	34	5
20	27.2	15	"	"	44.7	"	121.1	"	"	"	0.4	40	"
25	34.0	18	"	"	51.5	"	138.7	"	"	"	0.5	46	"
32	42.7	23	"	"	60.2	"	161.2	"	"	"	0.65	56	"
40	48.6	26	"	"	66.1	25	176.4	"	"	"	0.7	62	"
50	60.5	32	"	"	78	"	207.1	"	"	"	0.75	74	"
65	76.3	40	12	M 12	96.6	40	257	M 12	4	5.3	1.35	92	"
80	89.1	46	"	"	109.4	"	290.1	"	"	"	1.45	104	"
90	101.6	52	"	"	121.9	"	321.9	"	"	"	1.2	116	"
100	114.3	59	16	M16	139.3	50	370.5	M16	"	6.0	1.35	134	6
125	139.8	72	"	"	164.8	"	436.4	"	"	"	1.6	160	"
150	165.2	85	"	"	190.2	"	502	"	"	"	1.9	186	"
175	190.7	98	"	"	215.7	"	567.3	"	"	"	1.3	212	"
200	216.3	111	20	M20	247.8	60	652.6	M20	"	7.5	1.85	242	8
225	241.8	123	"	"	273.3	"	718.4	"	"	"	1.6	266	"
250	267.4	137	"	"	299	"	784.5	"	"	"	1.8	294	"
275	298.5	151	"	"	330	"	863.8	"	"	"	1.75	322	"
300	318.5	163	24	M24	355.5	70	932.5	M24	"	9.0	1.75	350	9
350	355.6	181	"	"	392.6	"	1028.4	"	"	"	2.2	386	"
400	406.4	207	"	"	443.4	"	1159.1	"	"	"	2.3	438	"
450	457.2	233	30	M30	501.7	80	1314.2	M30	"	10.5	2.4	496	10
500	508.0	259	"	"	552.5	"	1444.9	"	"	"	2.5	548	"
550	558.8	284	"	"	603.3	"	1576.2	"	"	"	3.1	598	"
600	609.6	310	36	M36	660.6	95	1729.9	M36	"	12.0	3.7	656	"
650	660.4	335	"	"	711.4	"	1858.4	"	"	"	3.6	706	"
700	711.2	361	"	"	762.2	"	1989.1	"	"	"	3.8	758	"

3.6. 2) U-BOLT FOR PIPE OF 50mm NOMINAL DIA. AND BELOW (ONLY PIPES RUNNING SHIP'S FORE AND AFT)

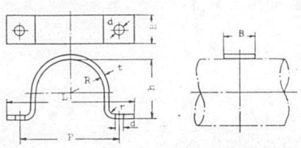


UNIT = mm

NOML. DIA.	OUT. DIA.	U-BOLT R	d	d1	H	H_1	E	LENG.	NUT NOML.	QUANT.	C	C_1	m	P
15	21.7	12	10	M10	40	22.5	20	111	M10	2	0.65	0~0.8	4.5	34
20	27.2	15	"	"	46	28	"	125	"	"	0.4	"	5.0	40
25	34.0	18	"	"	52	34.8	"	140	"	"	0.5	"	4.5	46
32	42.7	23	"	"	61	43.5	"	164	"	"	0.65	"	4.5	56
40	48.6	26	"	"	67	49.4	"	180	"	"	0.7	"	4.6	62
50	60.5	32	"	"	79	61.3	"	210	"	"	0.75	"	4.7	74

3.7. STEEL FLAT BAR BAND

MATERIAL : STEEL

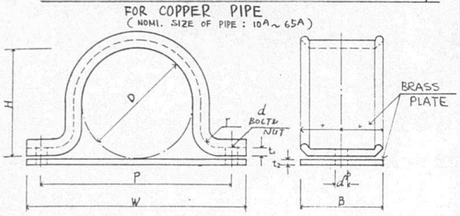


PIPE NOM DIA	OUT. DIA	STEEL FLAT BAR BAND B	t	R	r	h	P	d	L	BOLT & NUT NOM.	ℓ
10	17,3	25	3	9	4	16	62	12	86	M10	20
15	21,7	"	"	115	"	20,5	62	"	86	"	"
20	27,2	"	"	14	"	26	66	"	90	"	"
25	34,0	"	"	175	"	33	74	"	98	"	"
32	42,7	"	"	22	"	41,5	82	"	106	"	"
40	48,6	38	6	25	8	47,5	106	15	136	M12	30
50	60,5	"	"	31	"	59,5	118	"	148	"	"
65	76,3	"	"	395	"	74,5	136	"	166	"	"
80	89,1	"	"	46	"	87,5	148	"	178	"	"
90	101,6	"	"	52	"	100	160	"	190	"	"
100	114,3	50	9	585	12	112,5	194	19	234	M16	35
125	139,8	"	"	715	"	138,	220	"	260	"	"
150	165,2	"	"	845	"	163,5	246	"	286	"	"
175	190,7	"	"	97	"	189	272	"	312	"	"
200	216,3	65	9	110	12	214,5	306	23	356	M20	40
225	241,8	"	"	1225	"	240	330	"	380	"	"
250	267,4	"	"	1355	"	265,5	356	"	406	"	"
275	298,5	"	"	151	"	296,5	388	"	438	"	"
300	318,5	75	"	161	"	316,5	418	27	478	M24	50
350	355,6	"	"	180	"	353,5	456	"	516	"	"
400	406,4	"	"	205,5	"	404,5	508	"	568	"	"
450	457,2	90	"	231	"	455	570	33	640	M30	55
500	508,0	"	"	2565	"	506	622	"	692	"	"
550	558,8	"	"	2825	"	556	674	"	744	"	"
600	609,6	100	12	3085	15	607	750	39	830	M36	65
650	660,4	"	"	332	"	658	798	"	878	"	"
700	711,2	"	"	3575	"	708	848	"	928	"	"

3.8.1. BRASS BAND WITH BRASS SHEET

FOR COPPER PIPE

(NOML. SIZE OF PIPE : 10A ~ 65A)



NOMINAL DIA.	OUT. DIA. (mm)	MATERIAL SIZE B x t_1	B x t_2	D	r	P	W	H	d	d^ϕ
10A	15	24 x 1.5	24 x 1.5	15.5	2	50	80	14	M10x25	12
15	20	"	"	22	"	62	92	19.5	"	"
20	25	"	"	26	"	65	95	24	"	"
25	30	"	"	31	"	70	100	29	"	"
32	35	"	"	36	"	75	105	34	"	"
40	45	38 x 2.0	38 x 1.5	46	3	85	125	43	M12x25	14
50	55	"	"	56	"	100	140	53	"	"
65	70	38 x 3.0	38 x 1.5	72	5	120	160	68	"	"
80	85	"	"	85	"	135	175	83	"	"
90	95	"	"	95	"	145	185	93	"	"
100	110	50 x 5.0	"	110	7	170	220	107	M16x35	18
125	140	"	"	140	"	200	250	137	"	"
150	170	65 x 5.0	65 x 1.5	170	"	230	280	167	"	"
200	210	"	"	210	"	290	350	207	M20x40	23
250	260	65 x 6.0	"	260	"	340	400	257	"	"

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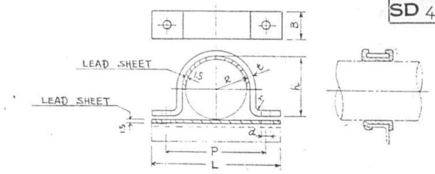
3.8.1. STEEL FLAT BAR BAND WITH LEAD SHEET

FOR COPPER PIPE

(NOMI. SIZE OF PIPE : 80A ~ 150A)

MES SD 43835T

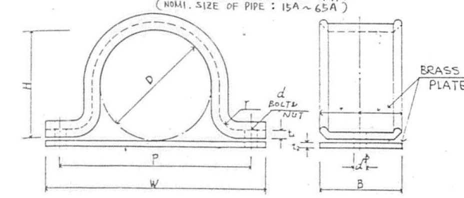


NOMI. SIZE OF PIPE	OUT DIA. OF PIPE (mm)	STEEL FLAT BAR BAND								BOLT & NUT		WEIGHT (kg)
		B	t	R	r	h	P	d	L	NOMI. SIZE	l	
80A	85	38	6	45	8	85.5	142	15	172	M12	30	1.2
90	100	38	6	52.5	8	100.5	158	15	190	M12	30	1.3
100	110	50	9	59	12	109	190	19	230	M16	35	2.2
125	140	↕	↕	74	↕	139	222	↕	262	↕	↕	2.5
150	160	50	9	84	12	159	242	19	282	M16	35	2.8

3.8.2. BRASS BAND WITH BRASS SHEET

FOR COPPER NICKEL PIPE

(NOMI. SIZE OF PIPE : 15A ~ 65A)



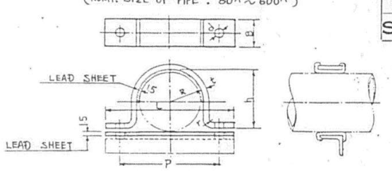
NOMINAL DIA.	OUT DIA.	MATERIAL SIZE		D	r	P	W	H	d	d^{ϕ}
		$B \times t_1$	$B \times t_2$							
15A	15.14	24×1.5	24×1.5	15.5	2	50	80	14	M10×25	12
20	21.49	"	"	22.0	2	62	92	19.5	"	12
25	28.24	"	"	29.0	2	70	100	27.0	"	12
32	34.59	"	"	36.0	2	75	105	34.0	"	12
40	40.95	38×2.0	38×1.5	42.0	3	85	125	40.0	M12×25	14
50	54.05	"	"	56.0	3	100	140	53.0	"	14
65	66.75	38×3.0	"	68.0	5	120	160	66.0	"	14

3.8.2. STEEL FLAT BAR BAND WITH LEAD SHEET

FOR COPPER NICKEL PIPE

(NOMI. SIZE OF PIPE : 80A ~ 600A)

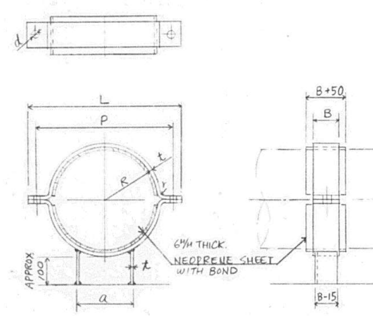
MES SD 43835



NOMI. SIZE OF PIPE	OUT DIA. OF PIPE (mm)	STEEL FLAT BAR BAND								BOLT & NUT		WEIGHT (Kg)
		B	t	R	r	h	P	d	L	NOMI. SIZE	l	
10												
15	15.4	25	3	10	4	15.5	64	10	84	M8	19	
20	21.49	↕	↕	13	↕	22.0	64	10	84	M8	19	
25	28.25	↕	↕	16.5	↕	28.5	74	12	98	M10	22	
32	34.60	25	3	20	4	35.0	80	12	104	M10	22	
40	40.95	38	6	23	8	41.5	106	15	136	M12	29	
50	54.05	↕	↕	29.5	↕	54.5	116	↕	146	↕	↕	
65	66.75			34.5		66	130		160			
80A	79.86	38	6	43	8	79	142	15	172	M12	29	1.2
90	92.96	38	6	49.5	8	92.5	146	15	186	M12	29	1.3
100	106.27	50	9	56	12	105.5	190	19	230	M16	38	2.2
125	131.67	↕	↕	69	↕	131	216	↕	256	↕	↕	2.5
150	157.58	↕		82		157	242	↕	282	↕	↕	2.8
175	183.08	50		94.5		182.5	268	19	308	M16	38	3.2
200	208.48	65		107.5		207	302	23	352	M20	44	5.2
225	234.49	↕		120.5		233	328	↕	378	↕	↕	5.6
250	260.50	↕		133.5		259	354	↕	404	↕	↕	6.1
275	286.72	65		144.5		285	380	23	430	M20	44	6.6
300	312.12	75		159.5		310.5	416	27	476	M24	50	8.8
350	363.73	↕		185.5		362	468	↕	528	↕	↕	9.9
400	414.53	75		211		413	520	27	580	M24	50	11.0
450	465.33	90		236		463.5	570	33	640	M30	57	14.1
500	516.94	↕	↕	262	↕	515.5	622	↕	692	↕	↕	15.4
550	567.74	90	9	287.5	12	566.5	674	33	744	M30	57	16.7
600	619.35	100	12	315	15	618	764	39	844	M36	68	24.1

3.9. STEEL FLAT BAR BAND FOR F.R.P. PIPE (1/2)

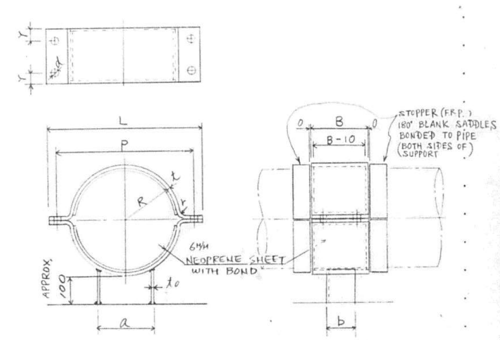
TYPICAL BAND



F.R.P. PIPE		STEEL FLAT BAR BAND								BOLT & NUT	
NOM. DIA.	OUT. DIA.	B	t	R	r	P	d	L	a	NOM. DIA.	l
350	356.8	90	9	185.5	12	466	27	526	200	M24	55
200	221.0	75	9	117.5	12	330	23	380	120	M20	50

3.9 BAND FOR THRUST ANCHOR (2/2)

(F.R.P. PIPE)



F.R.P. PIPE		STEEL FLAT BAR BAND											BOLT & NUT	
NOM. DIA.	OUT DIA.	B	ℓ	R	r	P	d	L	a	b	to	Y	NOM. DIA.	ℓ
350	356.0	150	9	185.5	12	466	27	526	200	130	12	30	M24	55
200	221.0	150	9	117.5	12	330	23	380	120	100	9	30	M20	50

3.10. PAD FOR PIPE SUPPORT (1/2)

In general, supports for pipes shall be provided on the stiffeners, longitudinals, horizontals, transverses, etc. When the supports are fitted on the plane side of bulkheads, deck plates, etc., the supports shall be provided on just the back side of the stiffeners, longitudinals, horizontals and transverses in general.

When the supports are unavoidably fitted on the water/oil-tight bulkhead plates, deck plates and inner bottom plates which form tanks, the pad for the supports shall be provided on the plate in accordance with the following table.

The size of pad plate shall be bigger than that of support by 20 mm (¾") and the thickness shall be at least 6 mm.

TABLE 3.9.1

Size of support & pipe	t < 11	11 ≦ t < 15	15 ≦ t
≧ 75 x 75 angle bar ≧ 90 flat bar ≧ 50A pipe ≧ 65 x 65 ANGLE BAR	o* / o	o* / o	o* / x
50x50, 40x40 angle bar 75, 65 flat bar 40A pipe	o	x	x
≦ 30x30 angle bar ≦ 50 flat bar ≦ 32A pipe	x	x	x

t: Plate thickness of Hull construction
o*: PAD PLATE TO BE APPLIED TO ALL SUPPORTS
o: Pad plate to be applied x: Pad plate not to be applied

Where the watertight or oiltight deck plates and bulkhead plates do not form tanks, the following standard shall be applied:

TABLE 3.9.2

Size of support & pipe	t < 11	11 ≦ t
≧ 65x65 angle bar ≧ 90 flat bar ≧ 50A pipe	o	x
≦ 50x50 angle bar ≦ 75 flat bar ≦ 40A pipe	x	x

3.10 (2/2)

TABLE 3.9.3 DIMENSION OF PAD PL. — MES STANDARD.

	ANGLE		FLAT BAR		PIPE	
SHAPE	L		L		D*	
PAD PLATE THICKNESS	at least 6 mm		at least 6 mm		at least 6 mm	
	ANGLE SIZE	L	FLAT BAR SIZE	L	PIPE SIZE	D.
SIZE OF PAD PL.	L-40×40	80	FB-65	105	40A	90
	L-50×50	90	" 75	115	50A	100
	" 65×65	105	" 90	130	65A	115
	" 75×75	115	" 100	140	80A	130
	" 90×90	130			90A	140
	" 100×100	140			100A	155
	" 130×100	170			125A	180

MATERIAL OF PAD PLATE

MATERIAL OF HULL CONSTRUCTION	MATERIAL OF PAD PLATE
HIGHER TENSILE STEEL	ABS CLASSED STEEL
EXCEPT HIGHER TENSILE STEEL	SS41 (EQUIVALENT TO ASTM A36)

4. PIPING PENETRATION

4.1 PENETRATION PIECE FOR STEEL & STAINLESS STEEL PIPES (1/5)

TYPE	SKETCH	APPLICATIONS	REMARKS
S-A	MIN. FLG. / D3* / D2* / FLG. / *	ALL PIPE LINES * FLANGE, BUTT OR SLEEVE JOINT (IN CASE THAT SLEEVE OR BUTT JOINT IS PERMITTED)	$t_1 \leqq t_2$ $D_3 = D_2 + 2L$ D_2 = FLG.O.D.+5 $\ell = (D_2 - D_1)/2$ t_1: PIPE THICK. MIN. L= $8 \leqq t_2 \leqq 12$ L=30 $12 < t_2 \leqq 16$ L=40 $16 < t_2$ L=50
S-B	ELBOW OR BENDING / FLG. / *	SAME AS S-A * ... SAME AS S-A TYPE	
S-C	D3* / D1* / SOCKET WELD COUPLING	ALL PIPE LINE	$D \leqq 65A$ D: NOMINAL SIZE OF PIPE $t_1 \leqq t_2$ $D_3 = D_2 + 2L$ $\ell = 30$ t_3 = PIPE THICK. L: SAME AS S-A
S-D	SOCKET WELD UNION	ALL PIPE LINE	CLASS I: PIPE SIZE: 65A & BELOW CLASS II: PIPE SIZE: ALL $t_1 \leqq t_2$, ℓ = MIN. 30 L: SAME AS S-A

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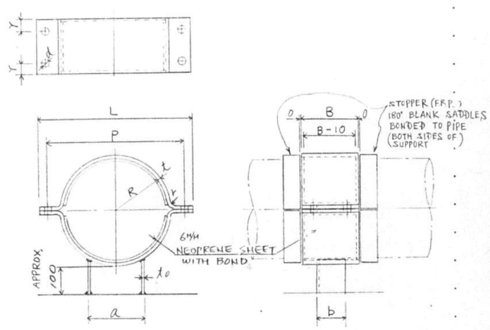
3.9 BAND FOR THRUST ANCHOR (2/2)
(F.R.P. PIPE)



F.R.P. PIPE		STEEL FLAT BAR BAND											BOLT & NUT	
NOM. DIA.	OUT DIA.	B	ℓ	R	r	P	d	L	a	b	t₀	Y	NOM. DIA.	ℓ
350	356.0	150	9	185.5	12	466	27	526	200	130	12	30	M24	55
200	221.0	150	9	117.5	12	330	23	380	120	100	9	30	M20	50

3.10. PAD FOR PIPE SUPPORT (1/2)

In general, supports for pipes shall be provided on the stiffeners, longitudinals, horizontals, transverses, etc. When the supports are fitted on the plane side of bulkheads, deck plates, etc., the supports shall be provided on just the back side of the stiffeners, longitudinals, horizontals and transverses in general.

When the supports are unavoidably fitted on the water/oil-tight bulkhead plates, deck plates and inner bottom plates which form tanks, the pad for the supports shall be provided on the plate in accordance with the following table.

The size of pad plate shall be bigger than that of support by 20 mm (¾") and the thickness shall be at least 6 mm.

TABLE 3.9.1

Size of support & pipe	t < 11	11 ≦ t < 15	15 ≦ t
≧ 75 x 75 angle bar ≧ 90 flat bar ≧ 50A pipe ≧ 65 x 65 ANGLE BAR	o* o	o* o	o* x
50x50, 40x40 angle bar 75, 65 flat bar 40A pipe	o	x	x
≦ 30x30 angle bar ≦ 50 flat bar ≦ 32A pipe	x	x	x

t: Plate thickness of Hull construction
o*: PAD PLATE TO BE APPLIED TO ALL SUPPORTS
o: Pad plate to be applied x: Pad plate not to be applied

Where the watertight or oiltight deck plates and bulkhead plates do not form tanks, the following standard shall be applied:

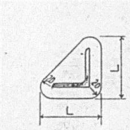
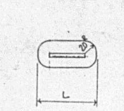
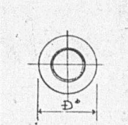
TABLE 3.9.2

Size of support & pipe	t < 11	11 ≦ t
≧ 65x65 angle bar ≧ 90 flat bar ≧ 50A pipe	o	x
≦ 50x50 angle bar ≦ 75 flat bar ≦ 40A pipe	x	x

3.10 (2/2)

TABLE 3.9.3

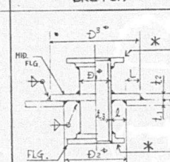
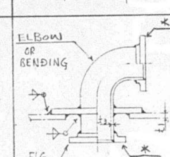
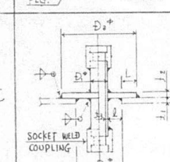
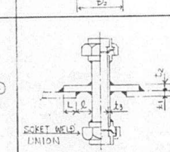
DIMENSION OF PAD PL. MES STANDARD.

	ANGLE		FLAT BAR		PIPE	
SHAPE						
PAD PLATE THICKNESS	at least 6 mm		at least 6 mm		at least 6 mm	
	ANGLE SIZE	L	FLAT BAR SIZE	L	PIPE SIZE	D
SIZE OF PAD PL.	L - 40 x 40	80	FB - 65	105	40A	90
	L - 50 x 50	90	" 75	115	50A	100
	" 65 x 65	105	" 90	130	65A	115
	" 75 x 75	115	" 100	140	80A	130
	" 90 x 90	130			90A	140
	" 100 x 100	140			100A	155
	" 130 x 100	170			125A	180

MATERIAL OF PAD PLATE

MATERIAL OF HULL CONSTRUCTION	MATERIAL OF PAD PLATE
HIGHER TENSILE STEEL	ABS CLASSED STEEL
EXCEPT HIGHER TENSILE STEEL	SS41 (EQUIVALENT TO ASTM A36)

4. PIPING PENETRATION
4.1 PENETRATION PIECE FOR STEEL & STAINLESS STEEL PIPES (1/5)

TYPE	SKETCH	APPLICATIONS	REMARKS
S-A		ALL PIPE LINES * FLANGE, BUTT OR SLEEVE JOINT (IN CASE THAT SLEEVE OR BUTT JOINT IS PERMITTED)	$t_1 \leq t_2$ $D_2 = D_1 + 2L$ D_1 = FLG.OD.+5 $\ell = (D_1 - D_2)/2$ t_2 = PIPE THICK.
S-B		SAME AS S-A * ... SAME AS S-A TYPE	MIN. L= $8 \leq t_2 \leq 12$ L=30 $12 < t_2 \leq 16$ L=40 $16 < t_2$ L=50
S-C		ALL PIPE LINE	D ≦ 65A D: NOMINAL SIZE OF PIPE $t_1 \leq t_2$ $D_3 = D_2 + 2L$ ℓ = 30 t_3 = PIPE THICK L: SAME AS S-A
S-D		ALL PIPE LINE	CLASS I: PIPE SIZE 65A & BELOW CLASS II: PIPE SIZE: ALL $t_1 \leq t_2$, ℓ MIN. 30 L: SAME AS S-A

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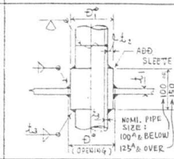
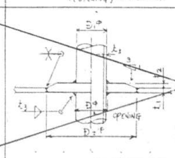
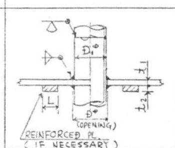
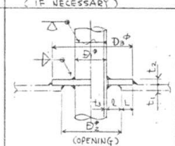
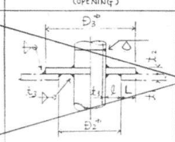
4.1 (2/5) 53/69

TYPE	SKETCH	APPLICATIONS	REMARKS
S-E		ALL PIPE LINE SAME AS S-A TYPE	$t_1 > t_2$ OR $t_1 \leqq t_2$ $D \leqq D_1 + 8$ mm t_2 = PIPE THICK
S-F		PIPES THROUGH CRITICAL AREA ONLY THE DETAIL SHALL BE SUBMITTED ON STRUCTURE DRAWING.	$t_1 < t_2 \leqq 2t_1$ $D \leqq D_1 + 8$ mm $D_2 \geqq \frac{t_1 \cdot D}{t_2} + D$
S-G		SAME AS S-E TYPE	$t_1 \leqq t_2$ $L \leqq D/2$ $D \leqq D_1 + 8$ mm
S-H		SAME AS S-E TYPE	$t_1 \leqq t_2$ ℓ = MIN. 30 t_3 = PIPE THICK L : SAME AS S-A $D_3 = D_2 + 2L$
S-I			$t_1 \leqq t_2$ $D_3 = D_2 + 2L$ $\ell = 60$ t_3 = PIPE THICK L : SAME AS S-A

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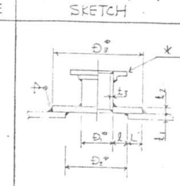
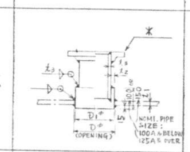
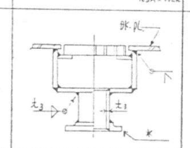
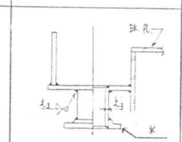
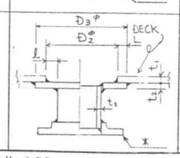
4.1 (3/5) 54/69

TYPE	SKETCH	APPLICATIONS	REMARKS
S-J		AIR PIPE LINE ON TANK TOP *… SAME AS S-A TYPE	L: SAME AS S-A $t_1 \leqq t_2$ $D_3 = D_2 + 2L$ ℓ = MIN. 24 t_3 = PIPE THICK
S-K		AIR PIPE LINE ON TANK TOP *… SAME AS S-A TYPE	$t_1 > t_2$ OR $t_1 \leqq t_2$ $D \leqq D_1 + 8$ mm t_3 = PIPE THICK.
S-L		DK. DRAIN PIPE LINE ON WORK SPACE *… SAME AS S-A TYPE	t_3 = PIPE THICK.
S-M		DK. DRAIN *… SAME AS S-A TYPE	t_3 = PIPE THICK.
S-N		DK. DRAIN *… SAME AS S-A TYPE	L : SAME AS S-A $t_1 \leqq t_2$ $D_3 = D_2 + 2L$ ℓ = MIN 24

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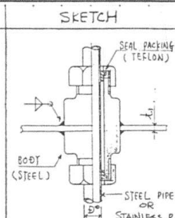
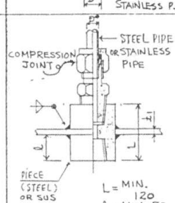
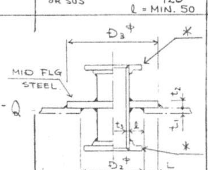
4.1 (4/5) 55/69

TYPE	SKETCH	APPLICATION	REMARKS
S-O		INSTRUMENT PIPE LINES	$D \leqq 15$ mm
S-P		INSTRUMENT PIPE LINES	STEAM SERV. ≦ 150 psi WATER SERV. ≦ 100 psi & 200°F OTHER SERV. NOMI. SIZE ABOVE 2" - NOT CLASS I ABOVE 1" TO 2" - MAX. 600 psi ABOVE 3/4" TO 1" - MAX. 1200 psi 3/4" AND BELOW - MAX. 1500 psi CLASS II … ALL
S-Q		STAINLESS STEEL PIPE * FLANGE, SOCKET WELD COUPLING OR BUTT WELD	$D_3 = D_1 + 22$ ℓ = MIN 30

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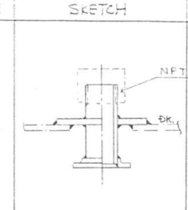
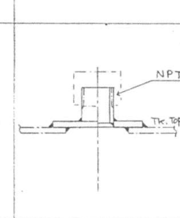
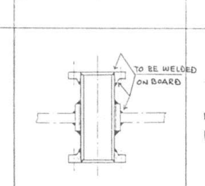
4.1 (5/5) 56/69

TYPE	SKETCH	APPLICATION	REMARKS
S-S		CONNECTION TO FIXTURE FILLING CAP SOUNDING CAP etc.	
S-T		CONNECTION TO FIXTURE FILLING CAP etc.	
S-U		ALL PIPE LINE IN NARROW SPACE WHERE S-A IS NOT PRACTICABLE	

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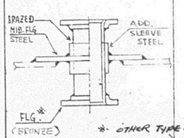
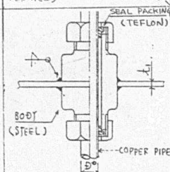
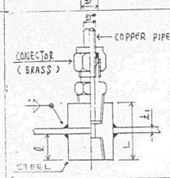
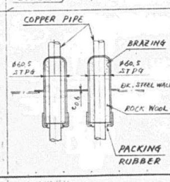
4.2.1 PENETRATION PIECE FOR COPPER & COPPER ALLOY PIPES

TYPE	SKETCH	APPLICATIONS	REMARKS
C-A	 * OTHER TYPE OF FLG., SEE ITEM 2.7	ALL PIPE LINES	
C-B		INSTRUMENT PIPE LINE	$D^{\phi} \leq 15^{\phi}$
C-C		INSTRUMENT PIPE LINE CONECTOR: FLARED JOINT OR COMPRESSION JOINT	$D^{\phi} \leq 15$ $L \geq 120$ $\ell \geq 50$ SEE "S-P" IN PG. 56
C-D		REFRIGERANT PIPE	

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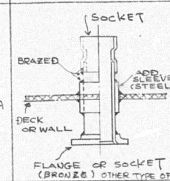
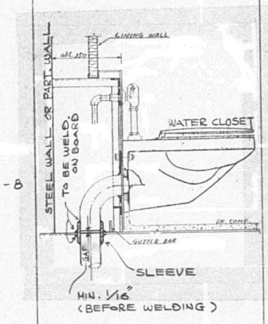
4.2.2 SPECIAL PENETRATION IN ACCOMMODATION

TYPE	SKETCH	APPLICATION	REMARKS
A-A		ALL PIPE LINE IN NARROW SPACE WHERE C-A IS NOT PRACTICABLE	COPPER AND COPPER ALLOY PIPES
A-B		SOIL AND DRAIN PIPE LINE IN NARROW SP. WHERE S-A AND S-U ARE NOT PRACTICABLE	FOR STEEL PIPE

NOTE: PENETRATION PIECE AND GALV. STEEL PIPE IN ACCOMMODATION;
TO AVOID THE DAMAGE OF GALVANIZED STEEL PIPES BY WELDING, UNNECESSARY SLEEVE JOINTS OR BUTT WELDING JOINT SHALL NOT BE USED AT PENETRATION OF DECK AND WALL OR IN PIPING EXCEPT THE CASES THAT SLEEVE JOINTS OR BUTT WELDING JOINTS ARE NECESSARY DUE TO THE SPACE REASONS IN NARROW SPACES IN ACCOMMODATION OR REQUIREMENT OF AUTHORITY.

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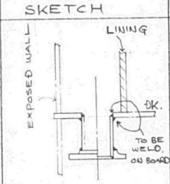
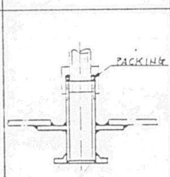
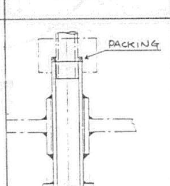
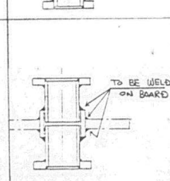
TYPE	SKETCH	APPLICATION	REMARKS
A-C		CEILING DRAIN (SWEAT SCUPPER)	FOR STEEL PIPE
A-D		CONNECTION TO FIXTURE (ACCOMMODATION DRAIN)	FOR STEEL PIPE
A-E		CONNECTION TO FIXTURE (NARROW SPACE ONLY) (ACCOMMODATION DRAIN)	FOR STEEL PIPE
A-F		SOIL, DRAIN AND AIR VENT PIPE LINE IN NARROW SPACE WHERE S-A AND S-U ARE NOT PRACTICABLE	FOR STEEL PIPE

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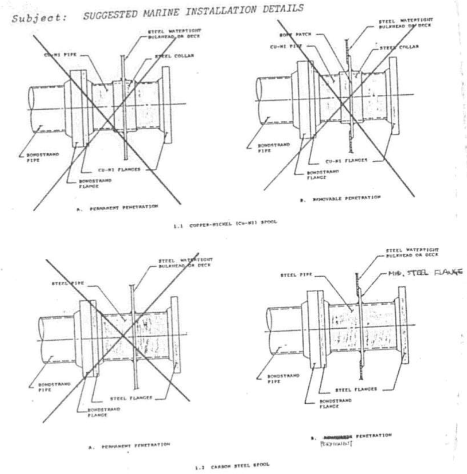
4.3 PENETRATION PIECE FOR F.R.P. PIPES

Ameron Corrosion Resistant Piping Division

Technical Data

MD-1 April 1977

Subject: SUGGESTED MARINE INSTALLATION DETAILS



DETAIL 1: TYPICAL WATERTIGHT BULKHEAD OR DECK PENETRATION

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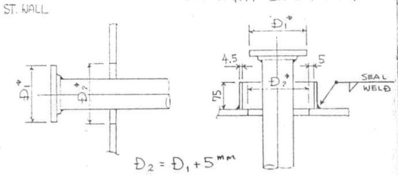
4.4. OPENING DETAIL OF NON TIGHT ST. WALL & GIRDER

4.4.1 FREE PENETRATION

FOR ST. WALL

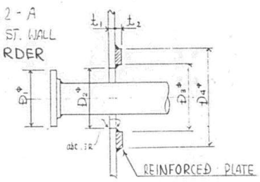
FOR NON-TIGHT DK OR FLAT



$D_2 = D_1 + 5^{mm}$

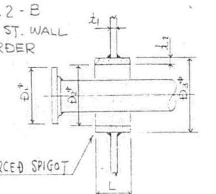
4.4.2 REINFORCED PENETRATION

4.4.2-A
FOR ST. WALL
& GIRDER



$t_1 \leq t_2$
$D_2 = D_1 + 5^{mm}$
$D_3 = D_2 + 30^{mm}$
$D_4 = D_2 + D_3$

4.4.2-B
FOR ST. WALL
& GIRDER



$t_1 \leq t_2$
$D_2 = D_1 + 5^{mm}$
$D_3 = D_2 + t_2 \times 2$
$L \geq 3/4 D_1$

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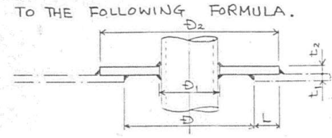
4.5. MATERIAL & THICKNESS FOR PENETRATION

(1) TABLE 4.5.1

	MATERIAL	THICKNESS	
PIPE	REF : PIPING DIAGRAM	SAME THICKNESS AS PIPE LINE	
FLANGE	〃	JIS STANDARD (MATERIAL TO BE EQUIVALENT TO ANSI.)	
ELBOW	〃	SAME THICKNESS AS PIPE LINE	
MID. FLANGE & ADDITIONAL SLEEVE & REINFORCED PLATE & SPIGOT PL.	(MID. FLANGE REINFORCED PLATE) SAME GRADE AS HULL CONSTRUCTION	THICKNESS OF HULL STRUCTURE	THICKNESS OF MID. FLG & ADD SLEEVE
		8 mm & BELOW	≧ 8 mm
		12 mm & BELOW	≧ 12 mm
		16 mm & BELOW	≧ 16.0 mm
		ABOVE 16 mm	SAME THICK. AS HULL CONSTRUCTION OR ABOVE

NOTE: WHERE MIDDLE FLANGE IS REQUESTED TO COMPENSATE THE STRENGTH OF HULL STRUCTURE, THICKNESS AND LAP OF MID. FLANGE SHALL BE DECIDED ACCORDING TO THE FOLLOWING FORMULA.



$(D_2 - D_1) \times t_2 \geq D \times t_1$

5. NAME PLATES FOR PIPING SYSTEM

Name plates for piping system shall be provided for operators to easily understand the systems and to prevent from inproper operation.

Name plates shall in principle be prepared for all the valves, cocks, air pipe heads, sounding pipe heads, etc. and secured in such manners as illustrated on the attached sheets.

Name plates shall be of 1.0 mm thick stainless steel plate and letter on the plate is of etching with black enamel except for the fire extinguishing system which is to be painted with red.

The above etching type name plate shall be applied in all the rooms and on weather decks.

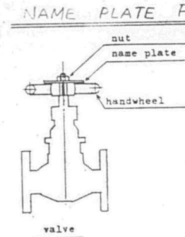
Size of letters to be maker's standard.

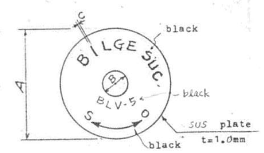
5.1 TANK NAME FOR DAILY TANK

Letter on tank are painted with black.

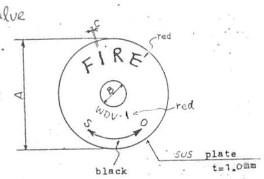
5.2 NAME PLATE FOR VALVE (1/4)

(TYPE 1)





Type 1 of name plate for valve shall be used preferentially.
Other type (type 2, 3 or 4) shall be used only when type 1 can not be applied.



size for name plates

size(mm) A x B	material	plate thick (mm)	line thick C (mm)
30 x 7	SUS 304	1	abt. 1
40 x 10	"	1	1
50 x 10	"	1	1
50 x 13	"	1	1
75 x 17	"	1	1
90 x 23	"	1	1
100 x 17	"	1	1
100 x 23	"	1	1
125 x 31	"	1	1
150 x 37	"	1	

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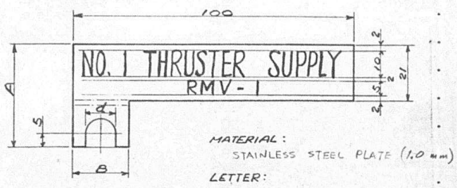
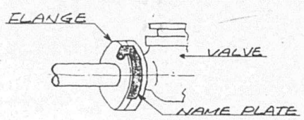
NAME PLATE FOR VALVE (3/4)
(TYPE 2)



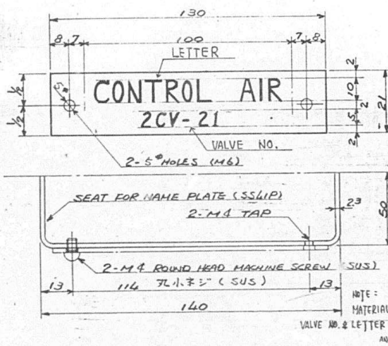
MATERIAL :
STAINLESS STEEL PLATE (1.0 mm)
LETTER :
ENGRAVED (0.5mm) AND
BLACK ENAMEL

FITTING METHOD



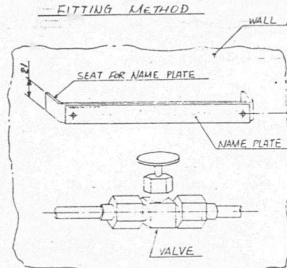
d (SIZE OF BOLT)	A	B	TYPE 記号
13 (M12)	40	25	15 - A
17 (M16)	45	35	15 - B
21 (M20)	48	40	15 - C
23 (M22)	51	45	15 - D
26 (M24)	54	50	15 - E

NAME PLATE FOR VALVE (3/4) TYPE : 3

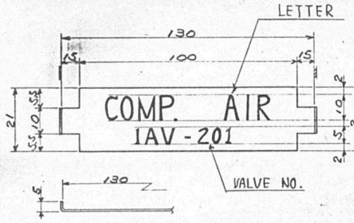


NOTE :
MATERIAL : STAINLESS STEEL PL (1.0mm)
VALVE NO. & LETTER : ENGRAVED (0.5mm) AND BLACK ENAMEL

FITTING METHOD

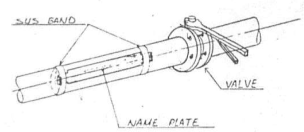


NAME PLATE FOR VALVE (4/4) TYPE : 4

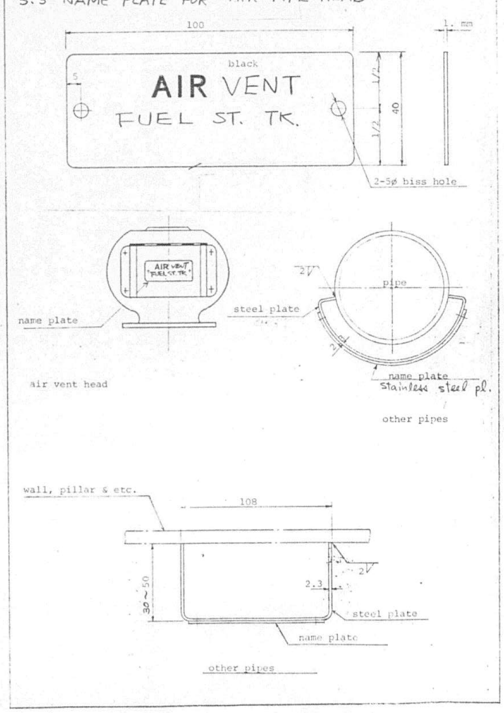


MATERIAL --- STAINLESS STEEL PLATE (1.0mm)
VALVE NO. & LETTER --- ENGRAVED (0.5mm) AND BLACK ENAMEL

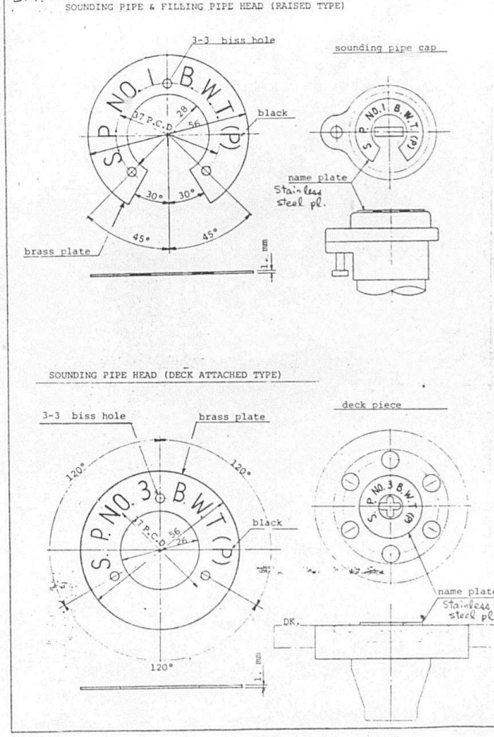
FITTING METHOD



5.3 NAME PLATE FOR AIR PIPE HEAD



5.4. NAME PLATE FOR: SOUNDING PIPE & FILL. PIPE HEAD



APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	JAN.31'88	EFT5/MES/061			FEB 1588	T-8-2		

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		~~MITSUBISHI KOBE~~	
NO.1323	DOCTOR LYKES	~~NO.1158~~	~~JAMES LYKES~~
NO.1324	ALMERIA LYKES	~~NO.1159~~	~~JOSEPH LYKES~~
NO.1325	TILLIE LYKES	~~NO.1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER | SHIP'S NO. | SHIP'S NAME

OUTFIT. DESIGN SEC.(PIPING)
SEC.CHIEF
ASSIST.CHIEF
CHARGE ENG'R 5.1987 T. Fujiwara
STAMP SHIP DESIGN DEPARTMENT
DATE (TEL 2240)

上甲板諸管配置（断面）
PIPING ARRANGEMENT ON UPPER DECK
(SECTION)

JOB NO. TS1323/24/25 JOBCLASSIF.NO.	SCALE 1/20	LYKES REF. NO. 480002	MITSUI DRAWING NO. 4100000

(6 SHEETS WITH COVER)

PLAN RECORD			
ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN. MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG.NO. 4100000 3/6

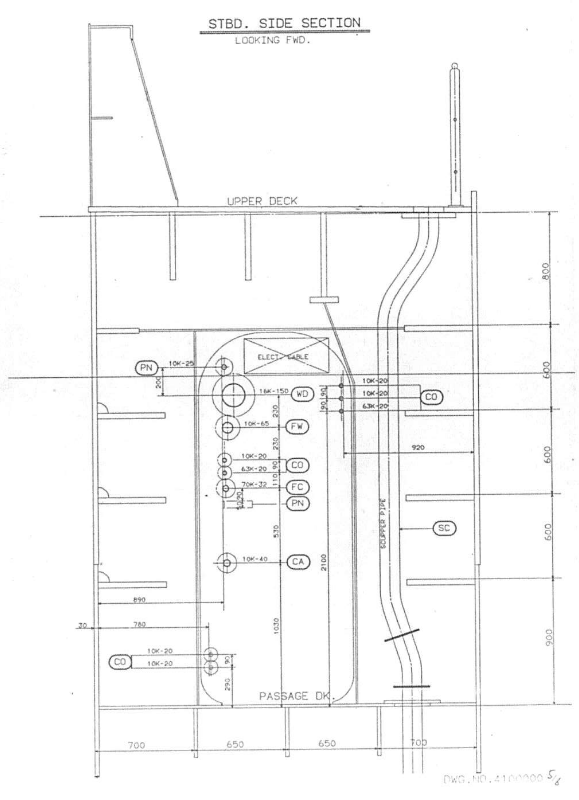
	GENERAL NOTE
1	BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.
2	THE COMP. AIR PIPE WHICH IS INSTALLED AT 1000 m/m HEIGHT ABOVE THE PASSAGE DECK IS SO DESIGNED THAT THE PIPE IS ALSO USED AS LIFE LINE.

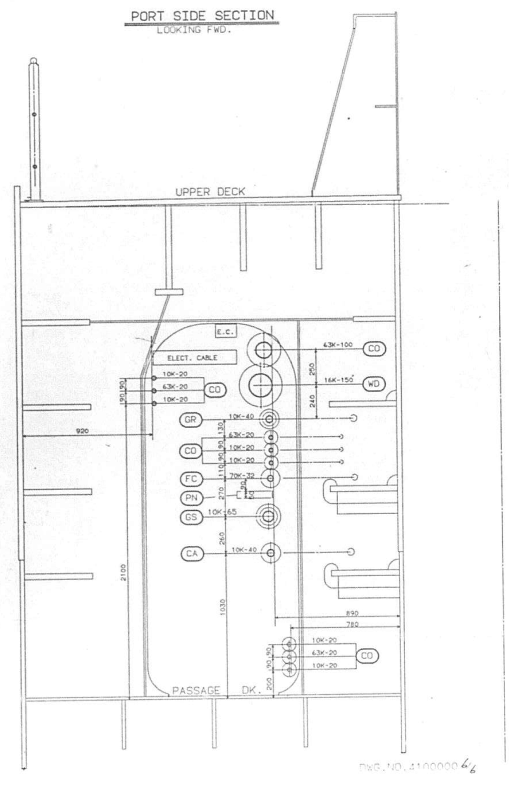
DWG.NO. 4100000 3/6

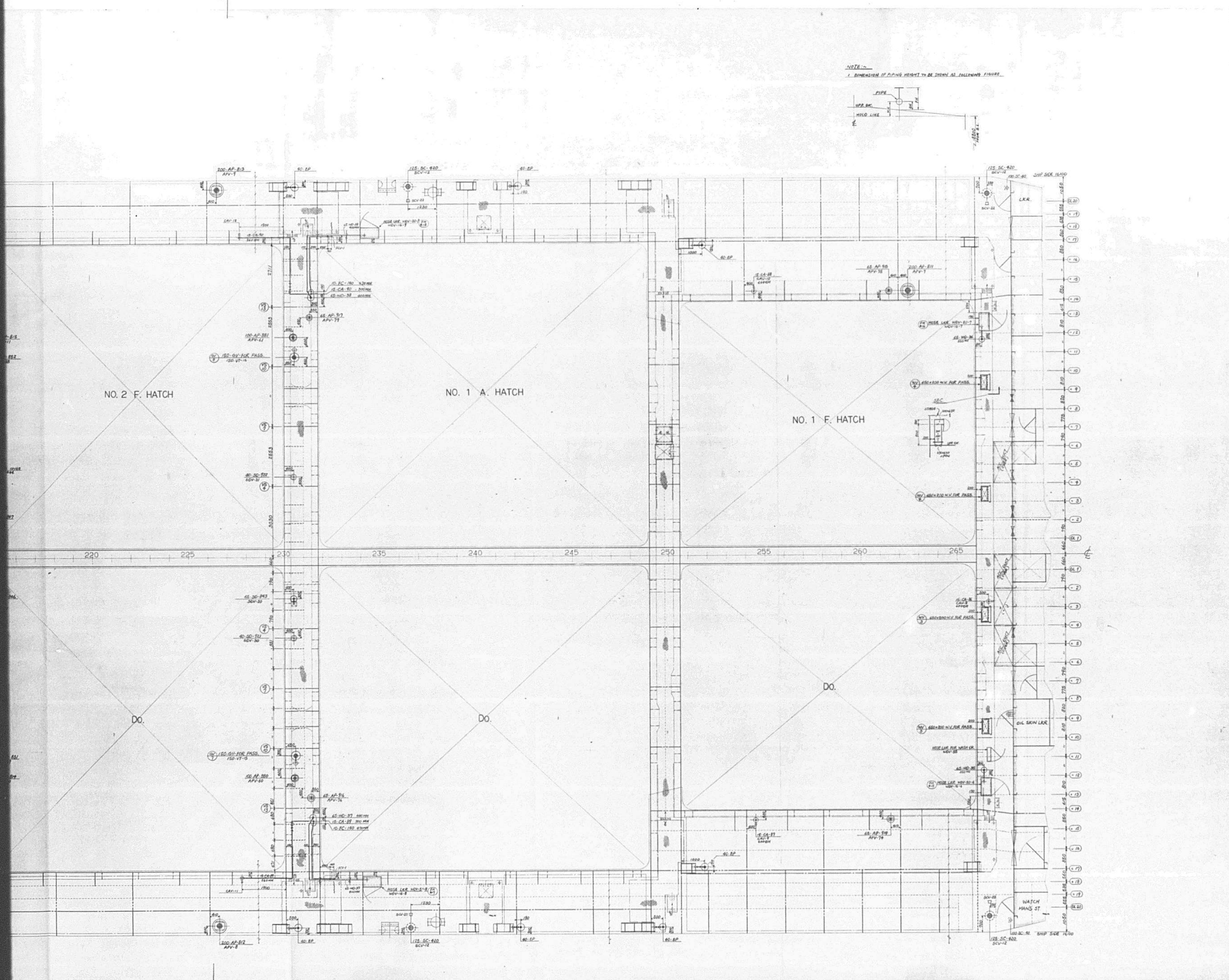
PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

4100000 4/6


STBD. SIDE SECTION
LOOKING FWD.
UPPER DECK
ELECT. CABLE
PN
10K-25
WD
16K-150
FW
10K-65
CO
10K-20
63K-20
FC
70K-32
CA
10K-40
SC
SCUPPER PIPE
PASSAGE DK.
800
600
600
600
900
920
2100
890
780
700
650
650
700
DWG.NO.4100000 5/6


PORT SIDE SECTION
LOOKING FWD.
UPPER DECK
E.C.
ELECT. CABLE
CO
63K-100
WD
16K-150
GR
10K-40
63K-20
10K-20
FC
70K-32
PN
GS
10K-65
CA
920
2100
1030
890
780
PASSAGE DK.
DWG.NO.4100000 6/6



PLAN RECORD			
ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN.	JULY 2 '86
		MADE APPLICABLE TO S.1324 AND S.1325	

GENERAL NOTE

1. REFERENCE DWG.
   1) PIPING ARR. UNDER UPP. DK. PASSAGE. (DWG. NO. 4100005)
   2) PIPING ARR. IN STEERING GEAR ROOM. (DWG. NO. 4100025)
   3) PIPING ARR. ON BHD. (DWG. NO. 6100030)
   4) PIPING ARR. IN NO.1 ~ NO.6 HOLD. (DWG. NO. 6100037~42)
   5) ARR. OF GENERAL PIPING IN ENG. RM. (UNDER UPP. DK.) (DWG. NO. 5161023~25)
   6) ARR. OF GENERAL PIPING IN ENG. RM. (UPPER PART) (DWG. NO. 5161026)

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	—	—	—	—		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NAME: TILLIE LYKES

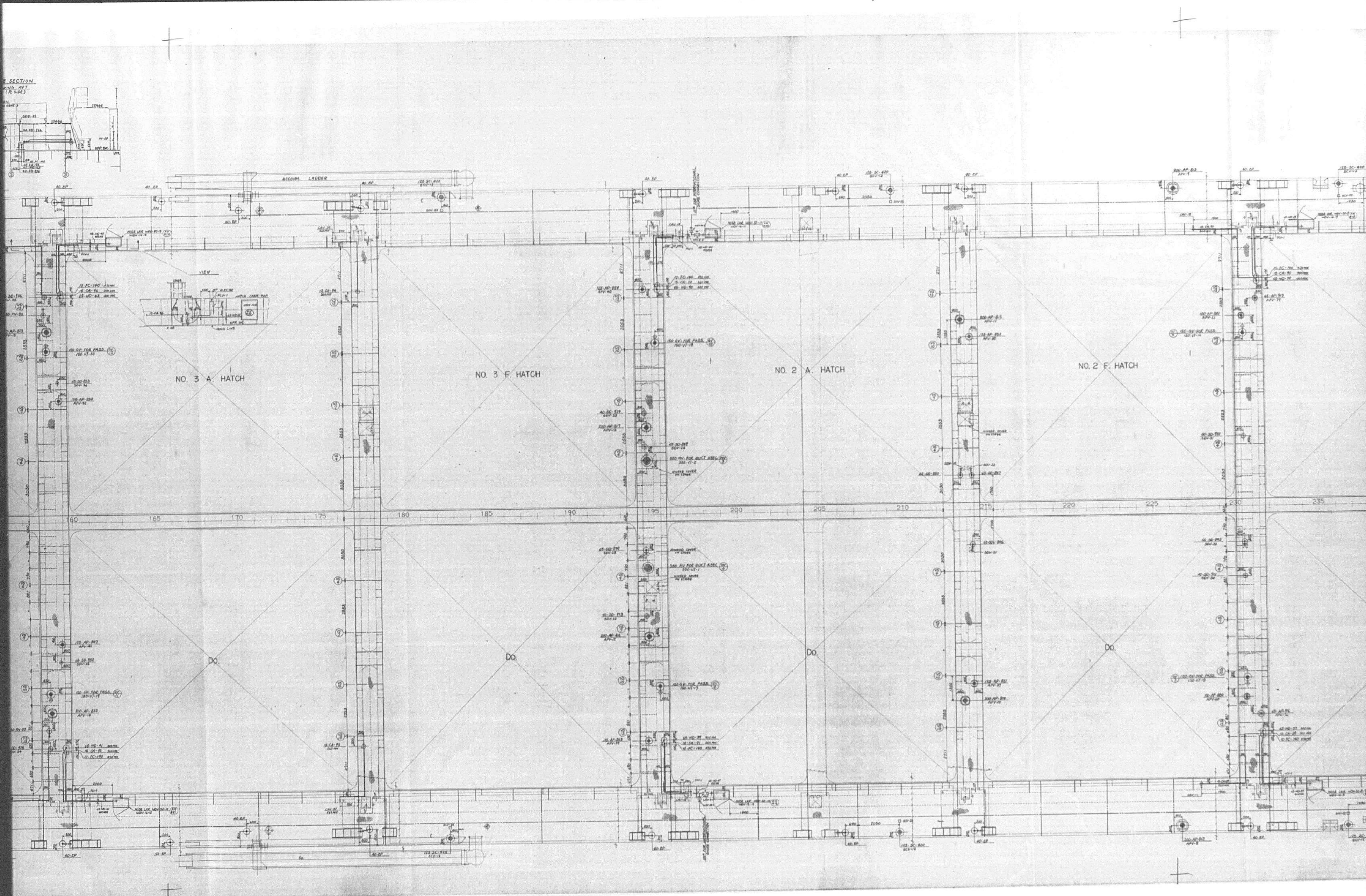
上甲板諸管配置(平面)

PIPING ARRANGEMENT ON UPP. DECK (PLAN)

DATE (TEL 2240) | SCALE 1/50 | LYKES REF. NO. 480003 | MITSUI DRAWING NO. 4100001

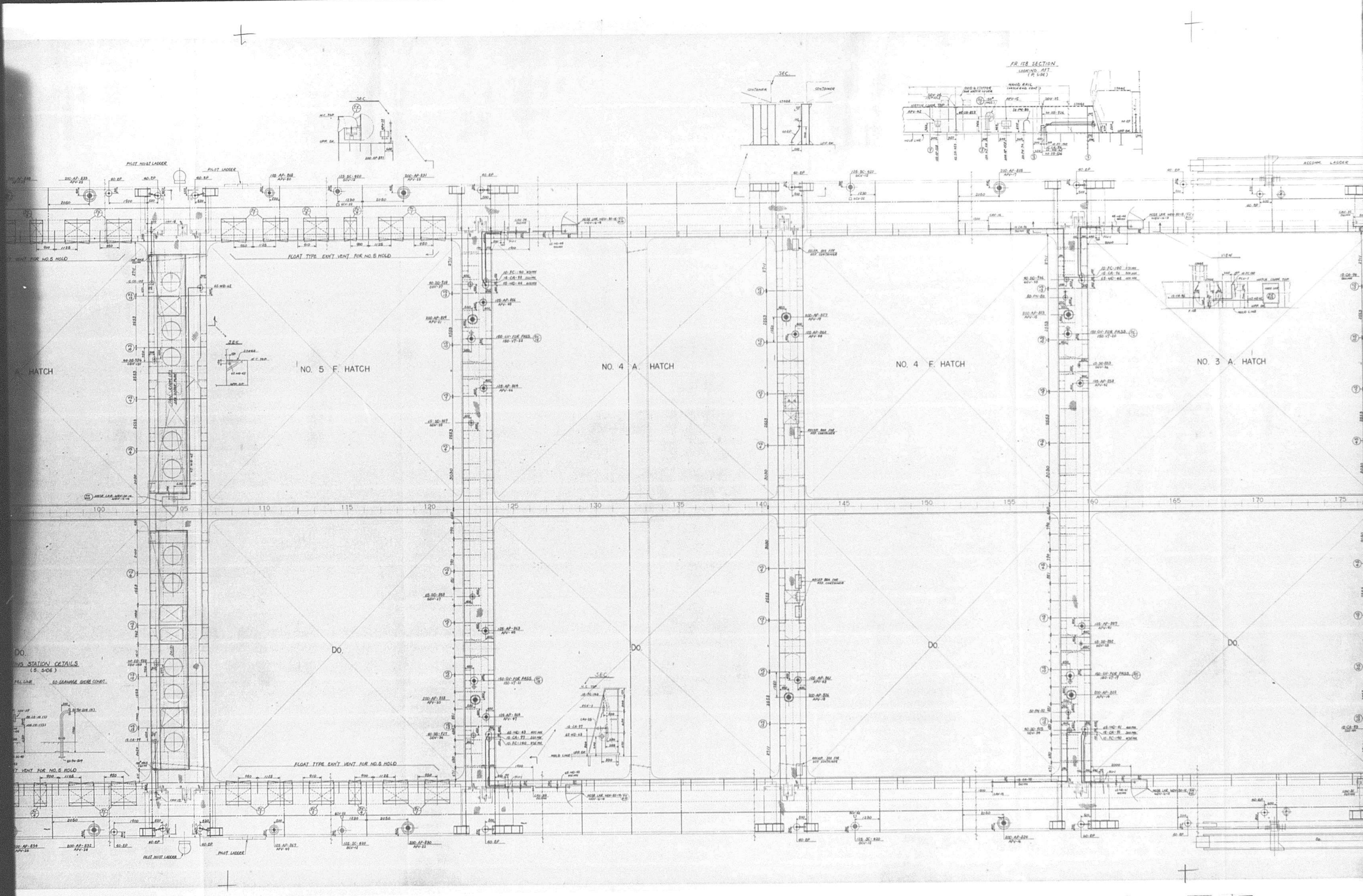
1/6

1493



NO. 3 A. HATCH
NO. 3 F. HATCH
NO. 2 A. HATCH
NO. 2 F. HATCH
DO.
DO.
DO.
DO.
ACCOMM. LADDER
VIEW

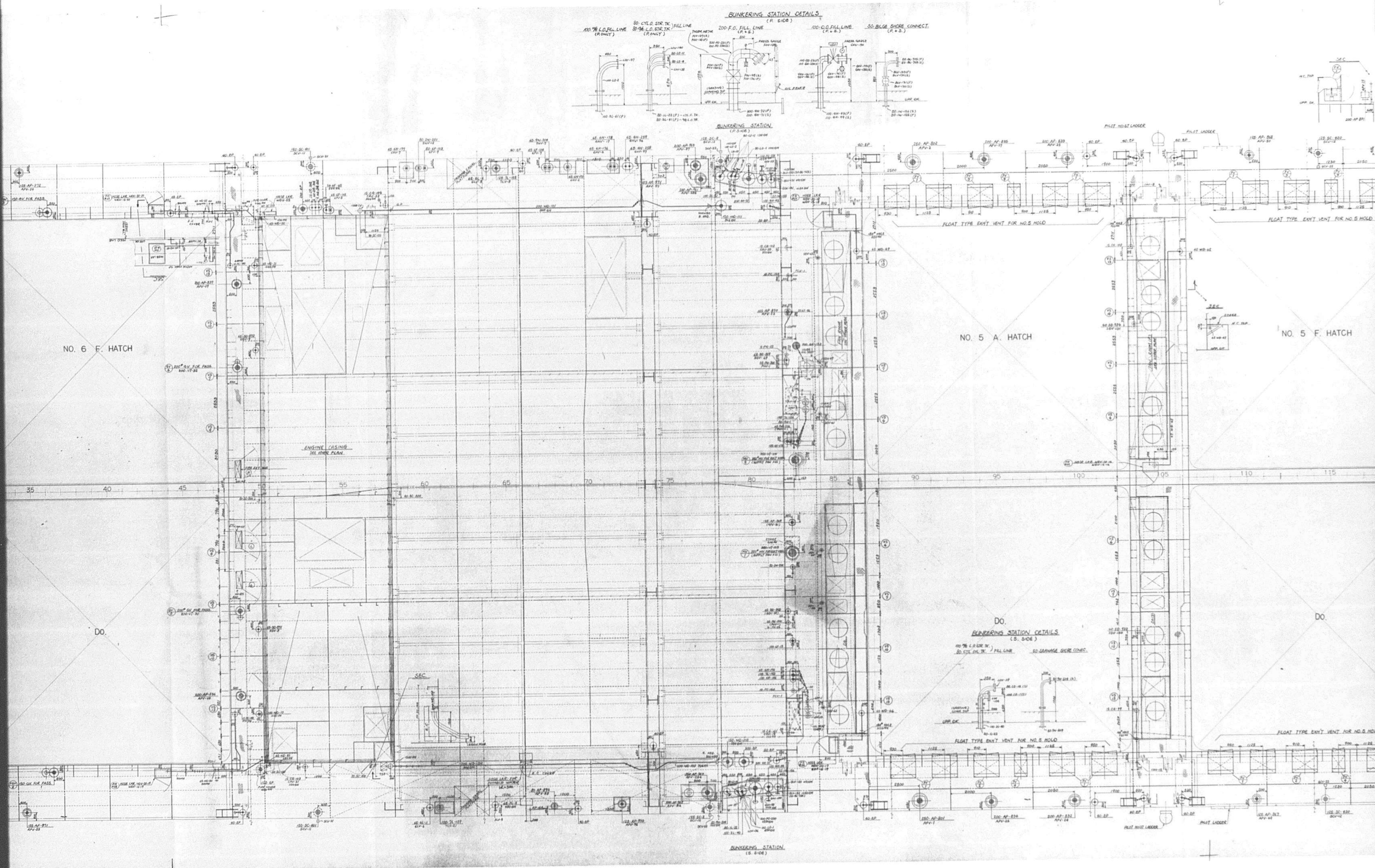
1494



NO. 5 F. HATCH
NO. 4 A. HATCH
NO. 4 F. HATCH
NO. 3 A. HATCH
FLOAT TYPE EXH'T VENT FOR NO.5 HOLD
FR 128 SECTION
LOOKING AFT

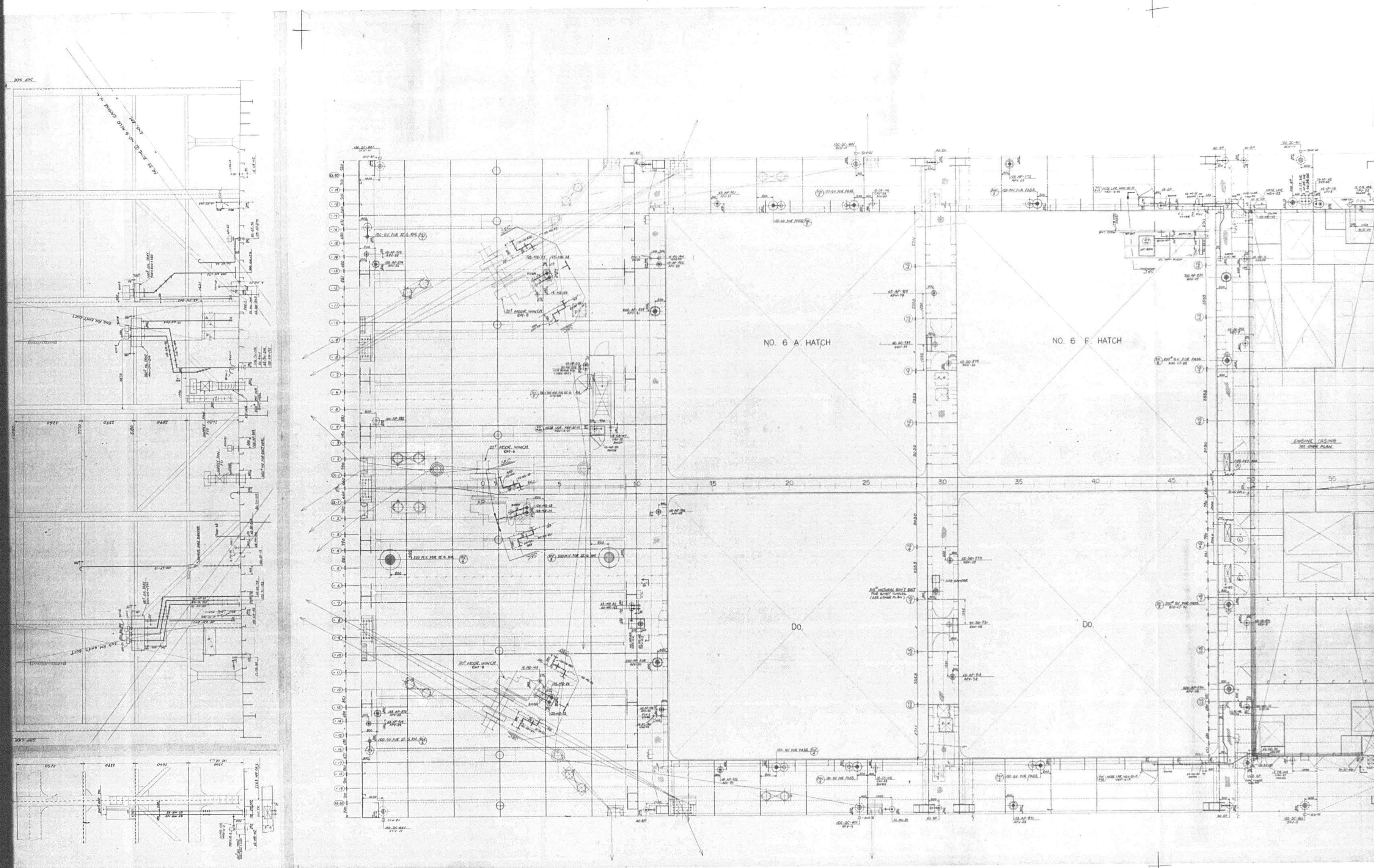
3/6

1495

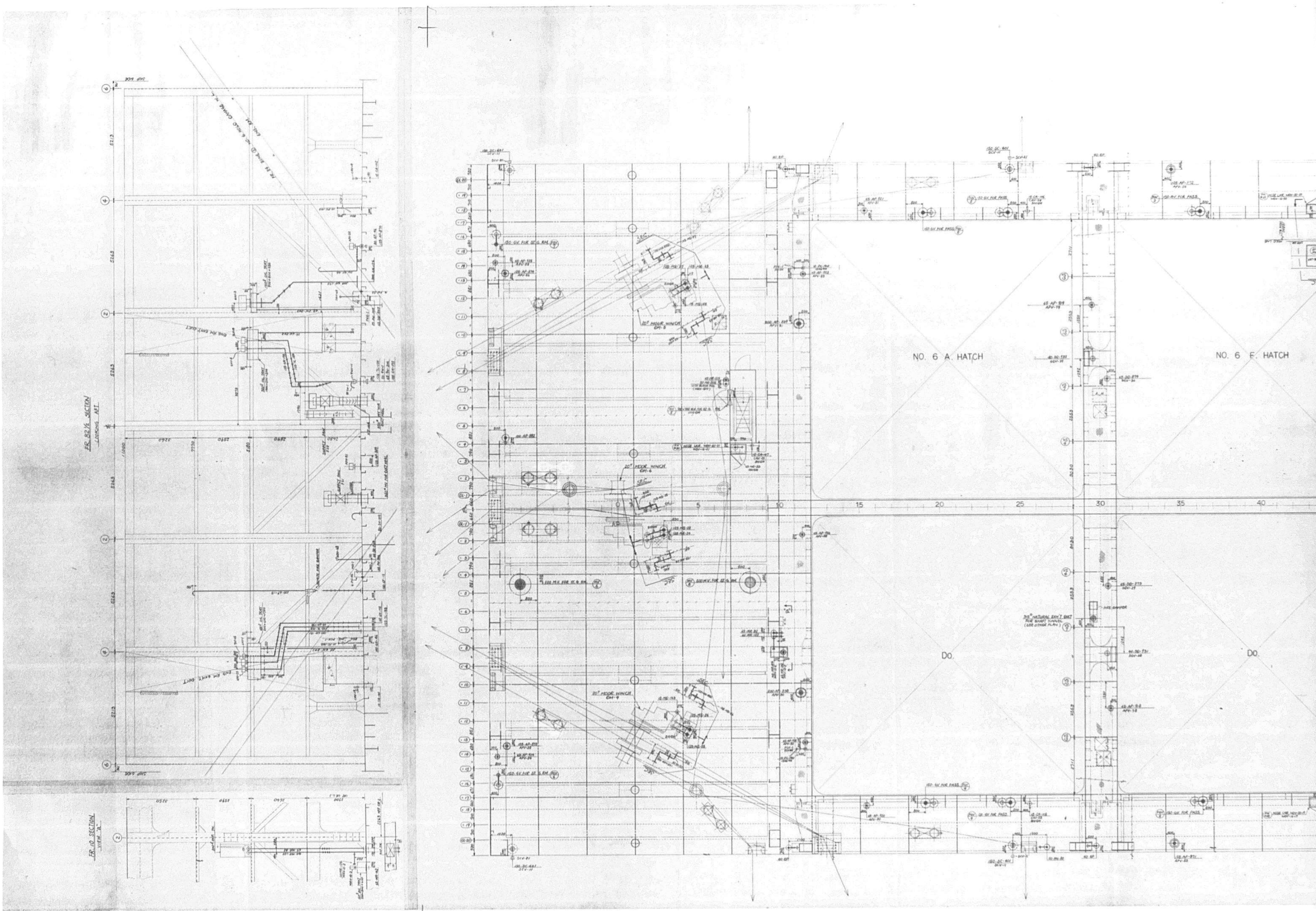


BUNKERING STATION DETAILS
BUNKERING STATION
NO. 6 F. HATCH
NO. 5 A. HATCH
NO. 5 F. HATCH
DO.
DO.
DO.
ENGINE CASING
FLOAT TYPE EXH'T VENT FOR NO.5 HOLD
BUNKERING STATION DETAILS
(S. S-106)
BUNKERING STATION
(S. S-106)

1496



5/6 1497



NO. 6 A. HATCH
NO. 6 F. HATCH
DO.
DO.
FR. 10 SECTION
1498

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY 28 '85	FTS/MES/458			MAY 31 '85	T-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	~~NO.1158~~	~~JAMES LYKES~~
NO.1324	ALMERIA LYKES	~~NO.1159~~	~~JOSEPH LYKES~~
NO.1325	TILLIE LYKES	~~NO.1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
OUTFIT. DESIGN SEC. (PIPING) SEC. CHIEF
SHIP'S NO.
SHIP'S NAME: **TILLIE LYKES**

パイプパッセージ諸管配置（居住区後部）
PIPING ARRANGEMENT UNDER UPP. DK. PASSAGE (ACCOM. AFT PART)
1/3

DATE (TEL 2240)
JOB NO. TS1323/24/25
SCALE 1/20, 1/50
LYKES REF. NO. 4?0004
MITSUI DRAWING NO. 4100005

(8 SHEETS WITH COVER)

1/12

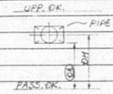
PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG. NO. 4100005 2/12

GENERAL NOTE

1 DIMENSION OF PIPING HEIGHT TO BE SHOWN AS FOLLOWING FIGURE.



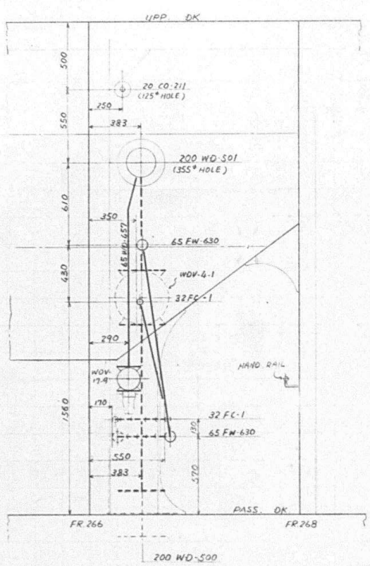
DWG. NO. 4100005 3/12

PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

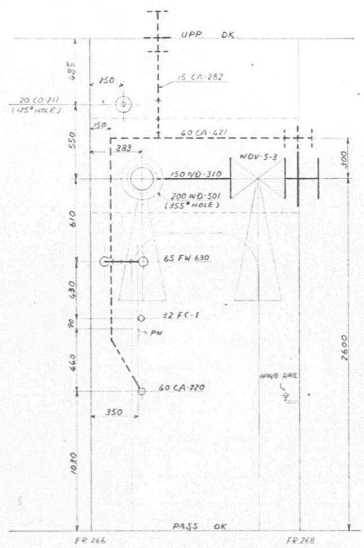
DWG. NO. 4100005 4/12

CR LINE SECTION
LOOKING PORT



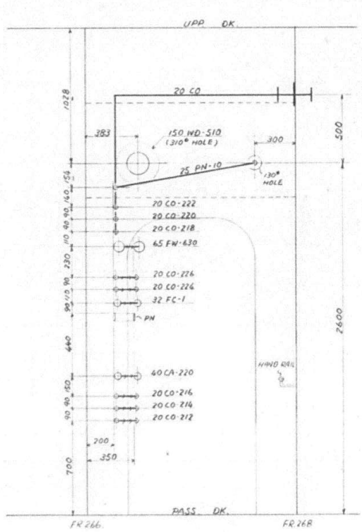
DWG. NO. 4100005 5/12

DL-4S SECTION
LOOKING PORT



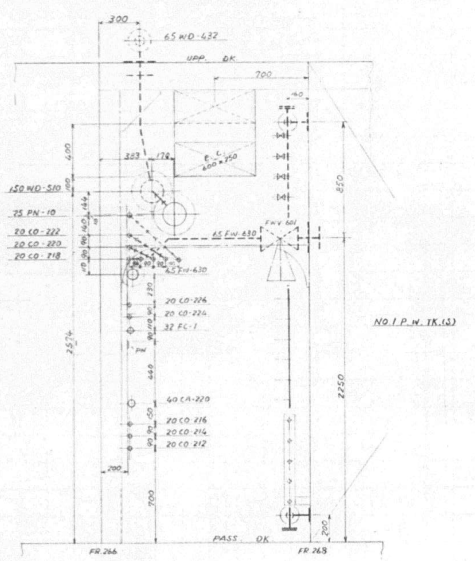
DWG. NO. 4100005 6/12

DL-8S SECTION
LOOKING PORT



DWG. NO. 4100005 7/12

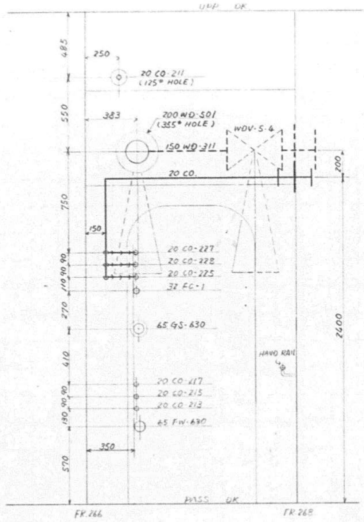
DL-14S SECTION
LOOKING PORT



DWG. NO. 4100005 8/12

DL-4P SECTION

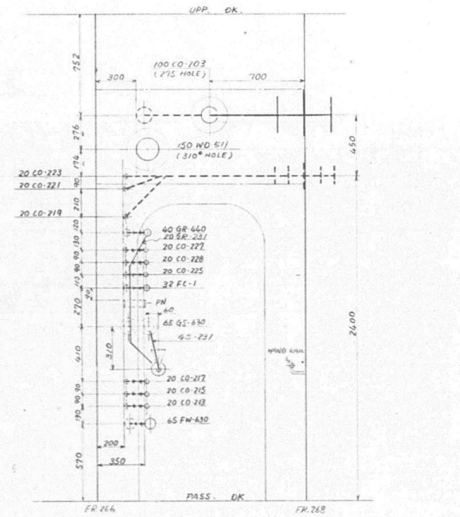
LOOKING PORT



DWG. NO. 4100005 9/12

DL-8P SECTION

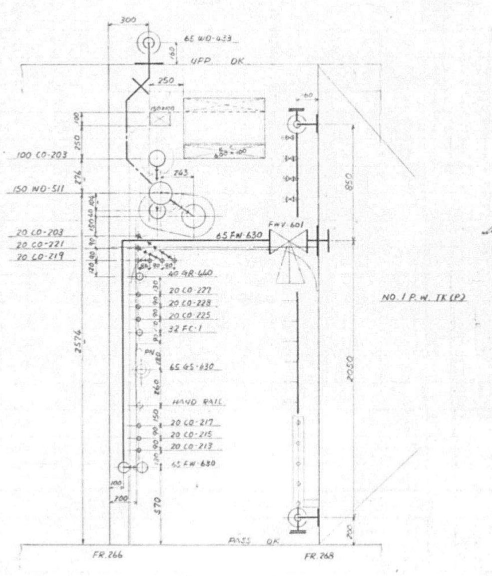
LOOKING PORT



DWG. NO. 4100005 10/12

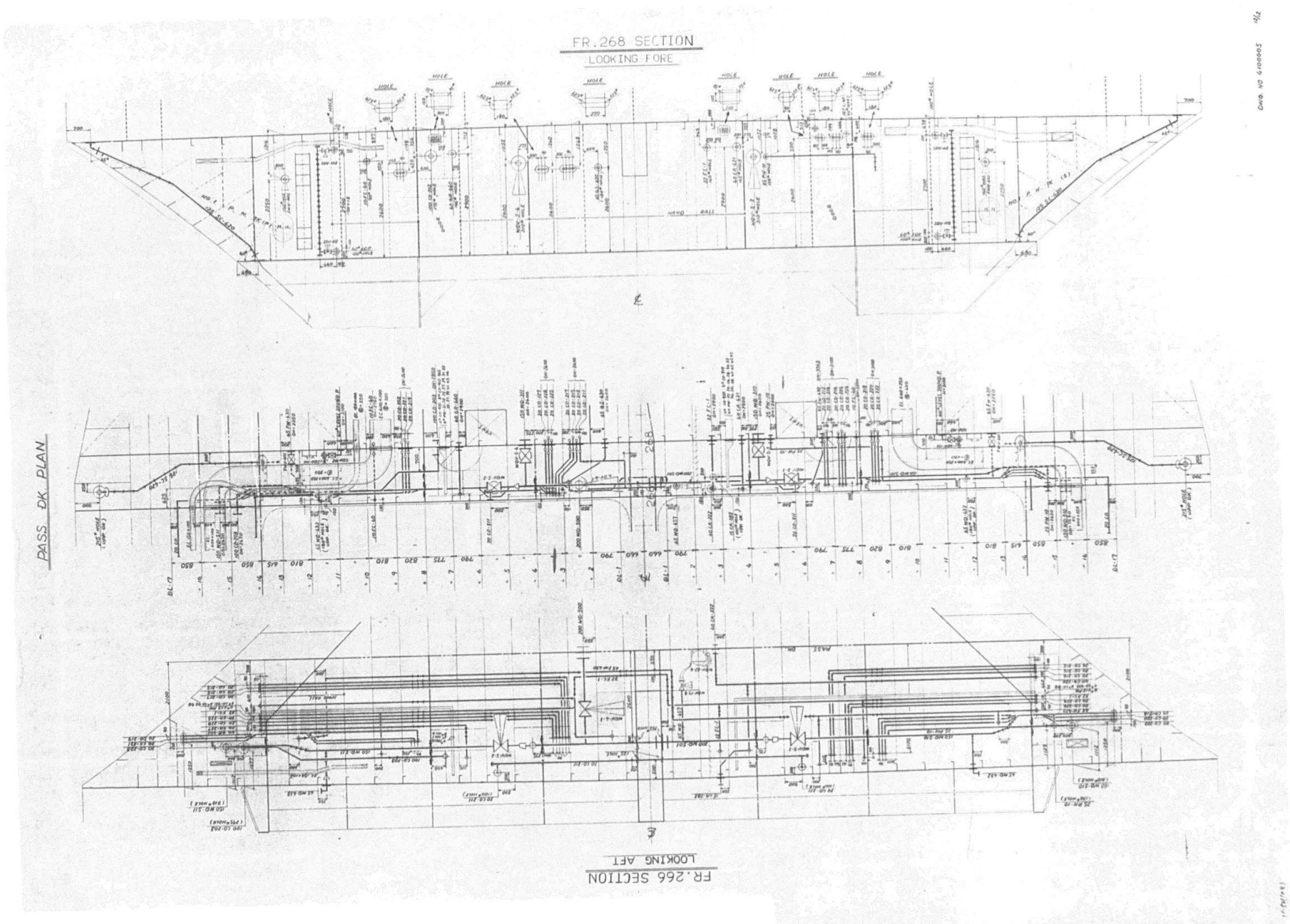
DL-14P SECTION

LOOKING PORT



DWG. NO. 4100005 11/12

1501


FR.268 SECTION
LOOKING FORE
PASS DK PLAN
FR.266 SECTION
LOOKING AFT

1502

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 28 '85	FTS/MES/658			MAY 31 '85	T-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC. (PIPING) SEC. CHIEF

パイプパッセージ諸管配置（前部）

PIPING ARRANGEMENT UNDER UPP. DK. PASSAGE (FORE PART) (2/3)

DATE NOV. 30. 1985 (TEL. 2240)

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25	1/20, 1/50	480004	4100005

(31 SHEETS WITH COVER)

1/31

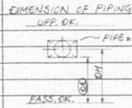
PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG. NO. 4100005 2/31

GENERAL NOTE

1. DIMENSION OF PIPING HEIGHT TO BE SHOWN AS FOLLOWING FIGURE.



DWG. NO. 4100005 3/31

PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
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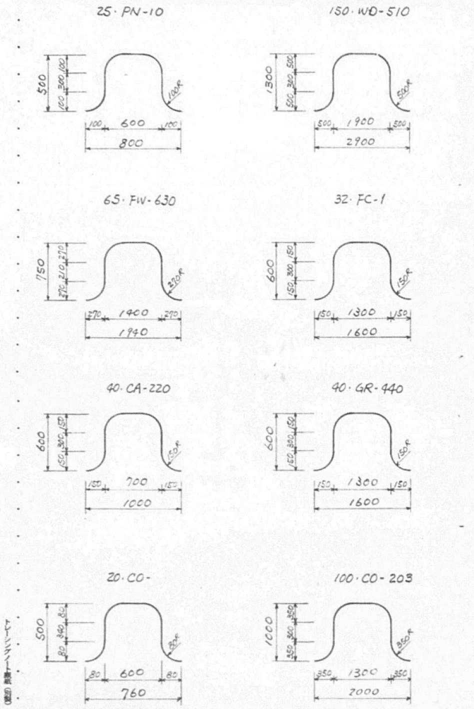
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

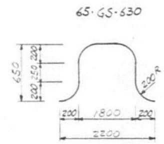
DWG. NO. 4100005 4/31

1503

DIMENSION OF EXPANSION BEND

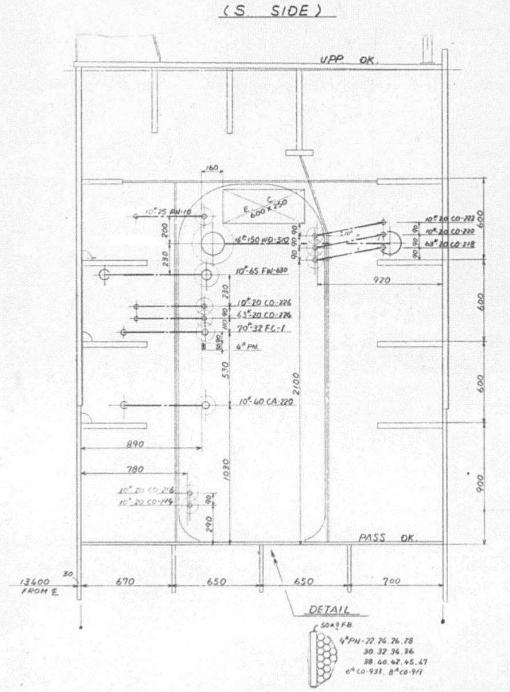


DWG. NO 4100005 5/31



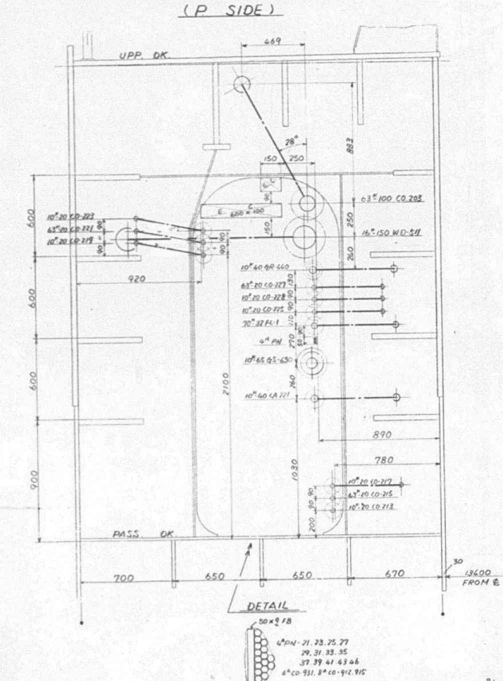
DWG. NO. 4100005 6/31

TYPICAL SEC. (S SIDE)



DWG. NO. 4100005 7/31

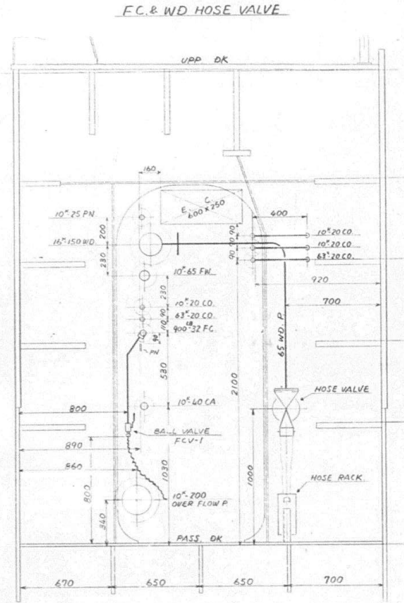
TYPICAL SEC. (P SIDE)



DWG. NO. 4100005 8/31

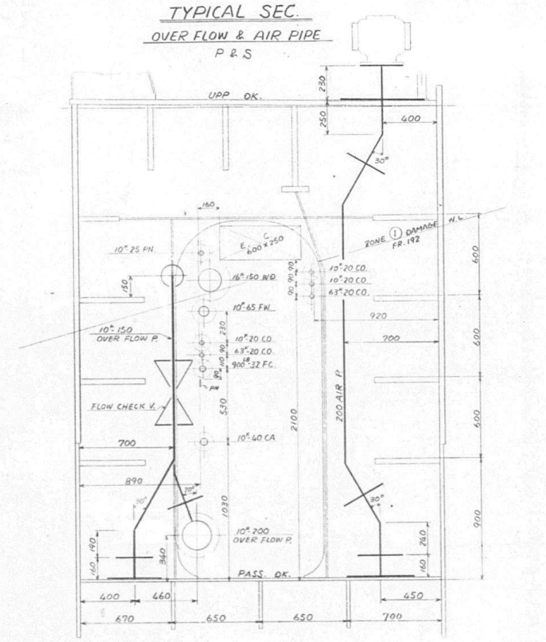
1504

TYPICAL SEC.
F.C. & WD HOSE VALVE



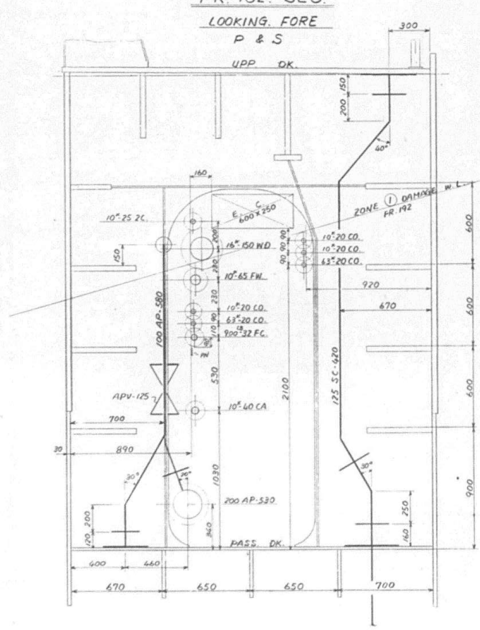
DWG. NO 6100005 9/31

TYPICAL SEC.
OVER FLOW & AIR PIPE
P & S



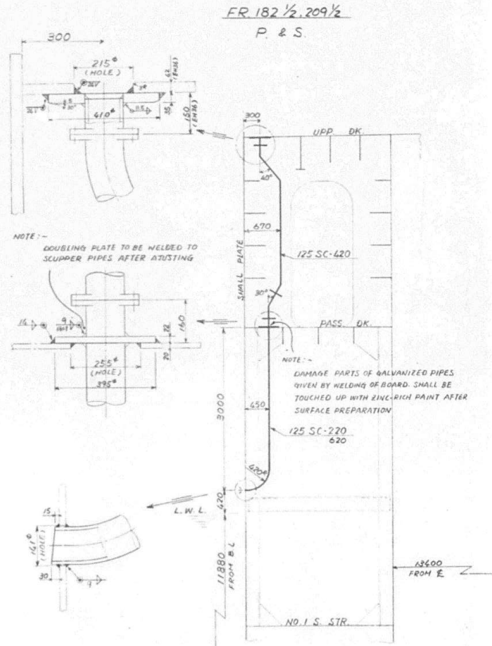
DWG. NO. 610000 10/31

FR 182. SEC.
LOOKING FORE
P & S



DWG. NO. 6100005 11/31

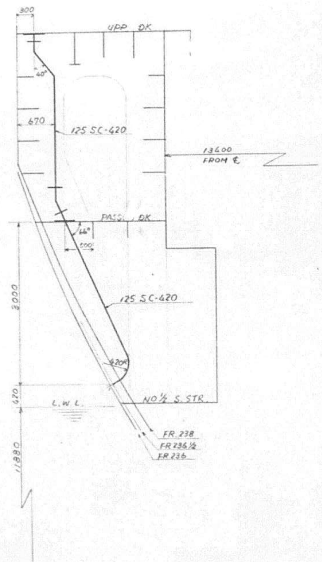
SCUPPER PIPE
FR 182 1/2, 209 1/2
P. & S.



DWG. NO. 6100005 12/31

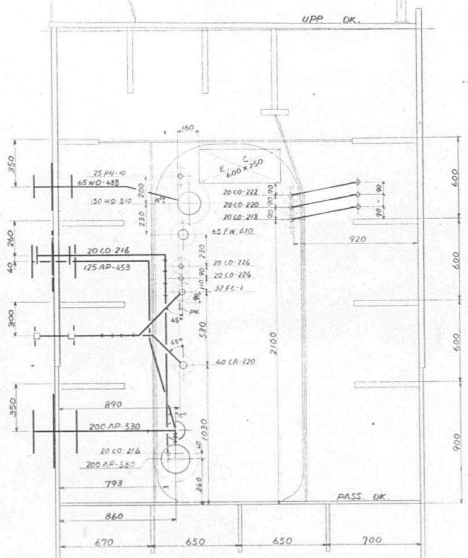
1505

FR. 236½ SEC.
(LOOKING FORE)
P & S.



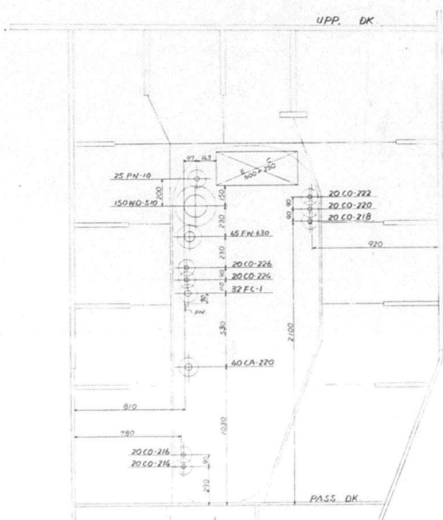
DWG. NO. 410000 13/31

FR. 195½ SEC.
(LOOKING FORE)
S. SIDE



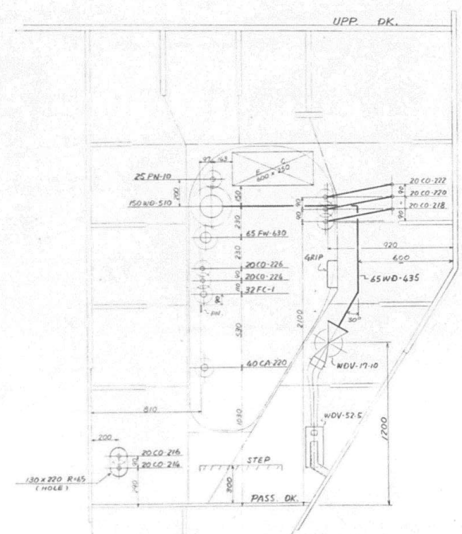
DWG. NO. 4100005 14/31

FR. 238 SEC.
(LOOKING FORE)
S. SIDE



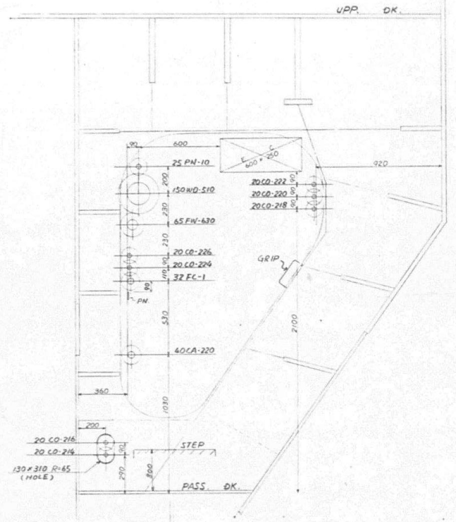
DWG. NO. 4100005 15/31

FR. 246 SEC.
(LOOKING FORE)
S. SIDE



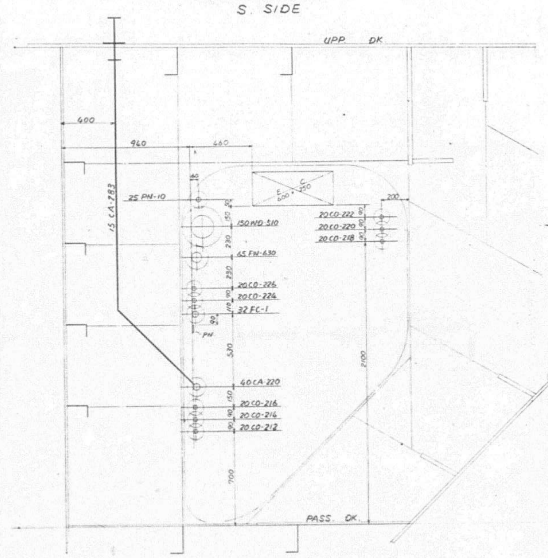
DWG. NO. 4100005 16/31

FR. 249 SEC.
(LOOKING FORE)
S. SIDE



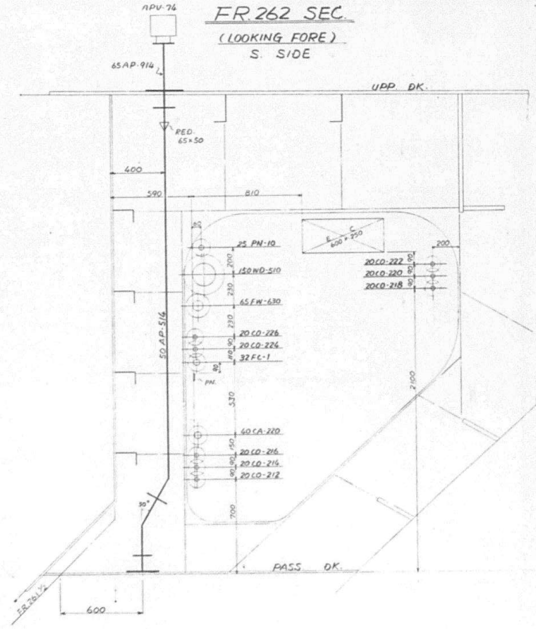
DWG. NO. 4100005

FR. 258 SEC.
(LOOKING FORE)
S. SIDE



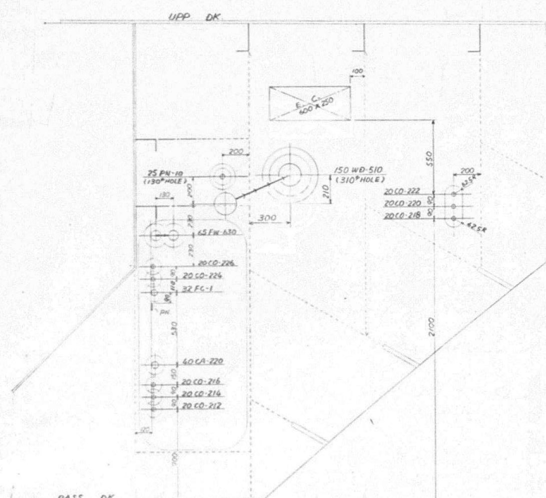
DWG. NO. 4100005

FR. 262 SEC.
(LOOKING FORE)
S. SIDE



DWG. NO. 4100005

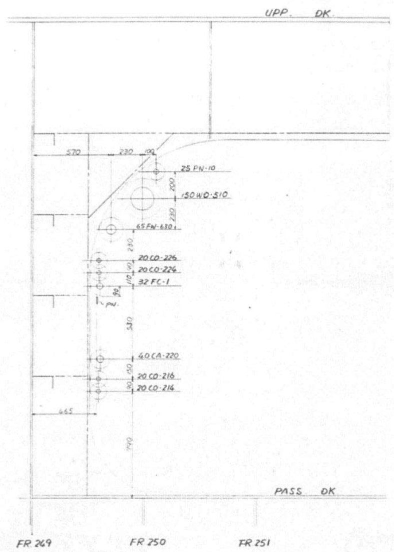
FR. 266 SEC.
(LOOKING FORE)
S. SIDE



DWG. NO. 4100005

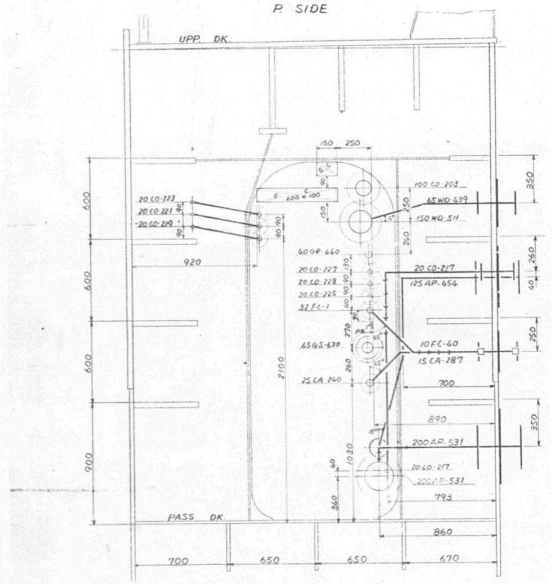
1507

BL-17 SEC.
(LOOKING PORT)
S. SIDE



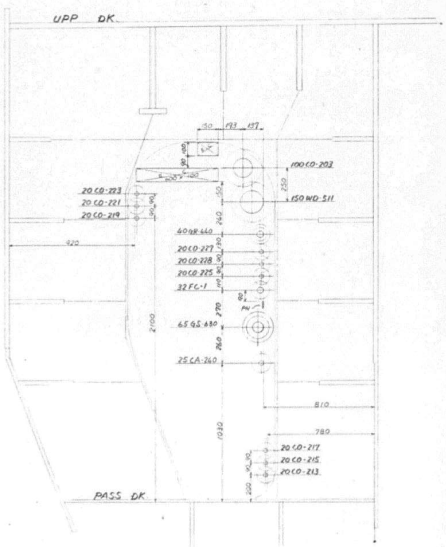
DWG. NO. 4100005 $^{2}/_{31}$

FR. 195½ SEC.
(LOOKING FORE)
P. SIDE



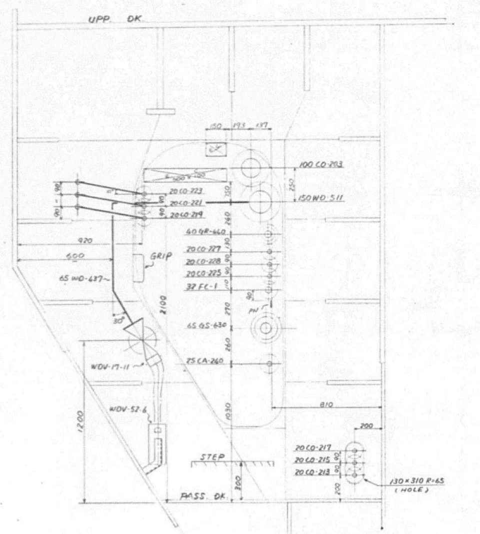
DWG. NO. 4100005 $^{23}/_{31}$

FR. 238 SEC
(LOOKING FORE)
P. SIDE



DWG. NO. 4100005 $^{25}/_{31}$

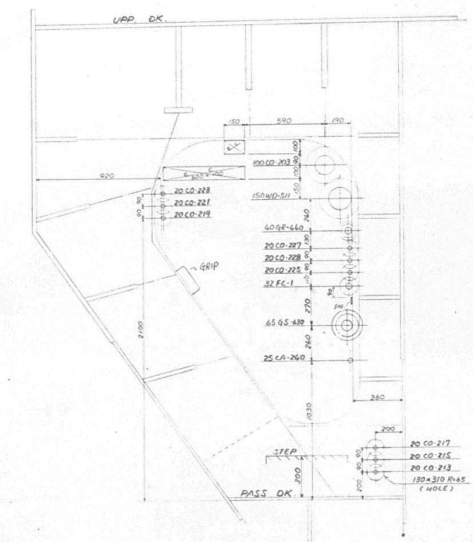
FR. 246 SEC.
(LOOKING FORE)
P. SIDE



DWG. NO. 4100005 $^{26}/_{31}$

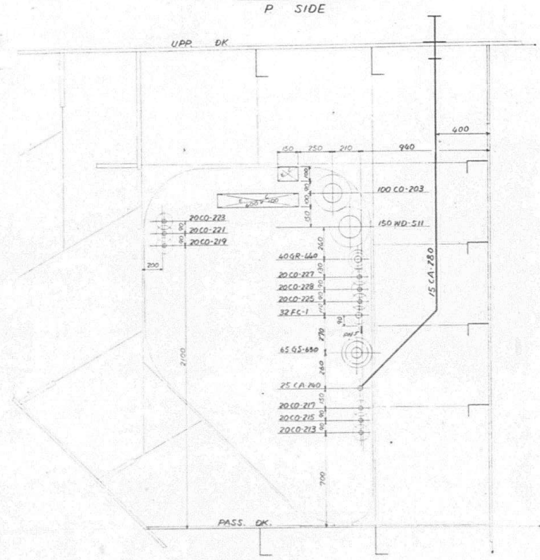
1508

FR. 249 SEC.
(LOOKING FORE)
P SIDE



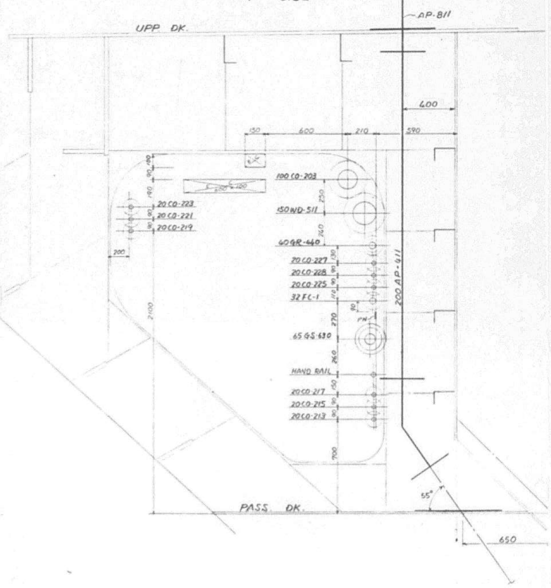
DWG. NO. 4100005 25/31

FR. 258 SEC.
(LOOKING FORE)
P SIDE



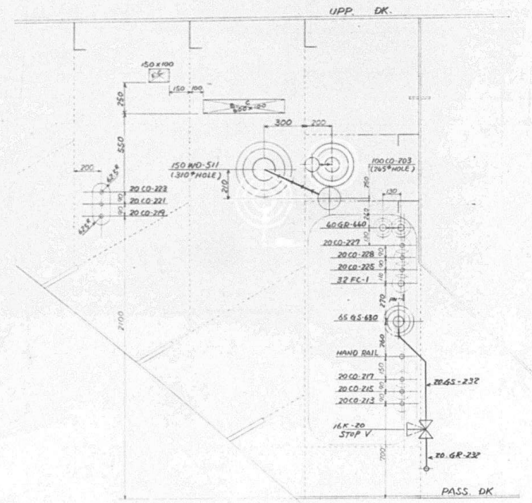
DWG. NO. 4100005 26/31

FR. 262 SEC.
(LOOKING FORE)
P SIDE



DWG. NO. 4100005 27/31

FR. 266 SEC.
(LOOKING FORE)
P SIDE

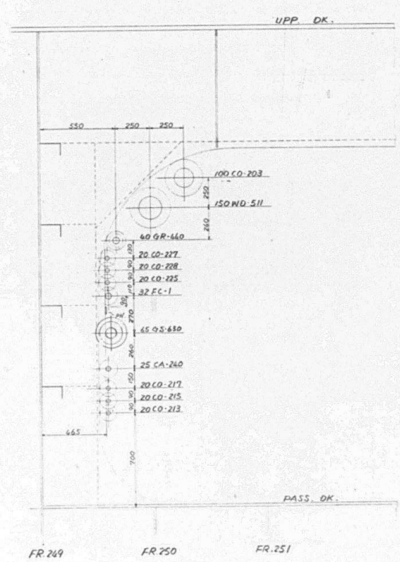


DWG. NO 4100005 28/31

1509

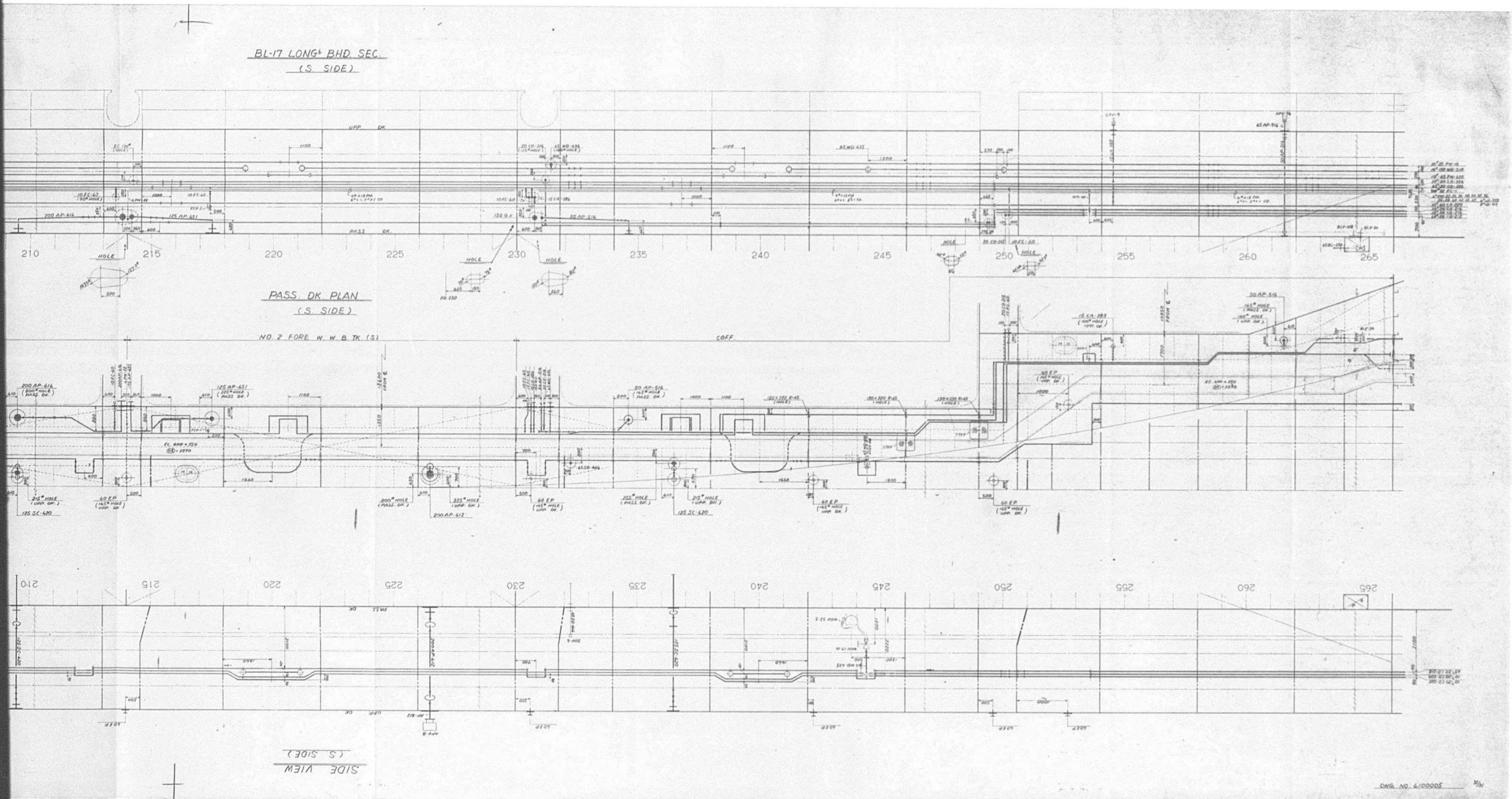
BL-17 SEC.

(LOOKING PORT)
P. SIDE



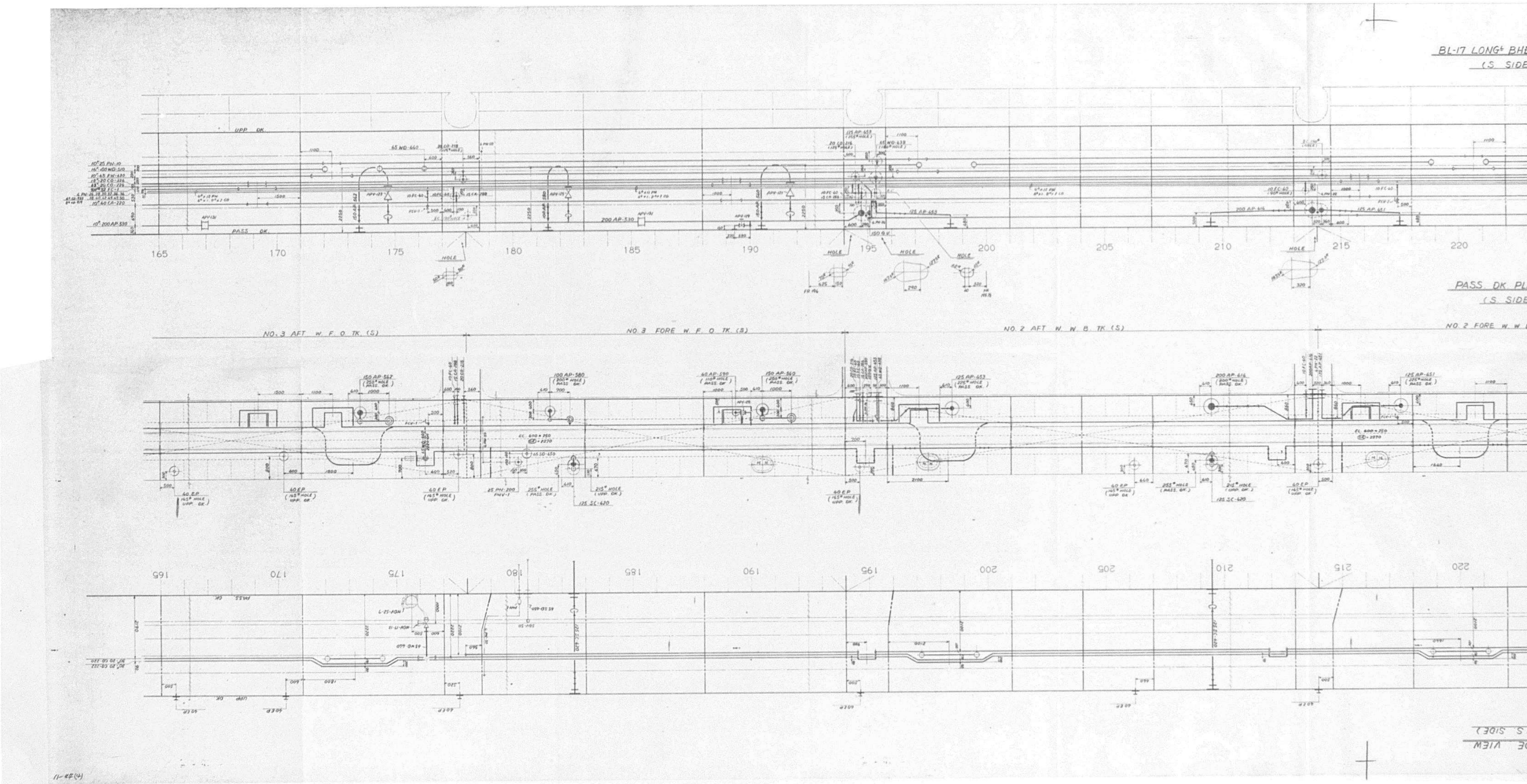
DWG. NO. 4100005 29/31

1510

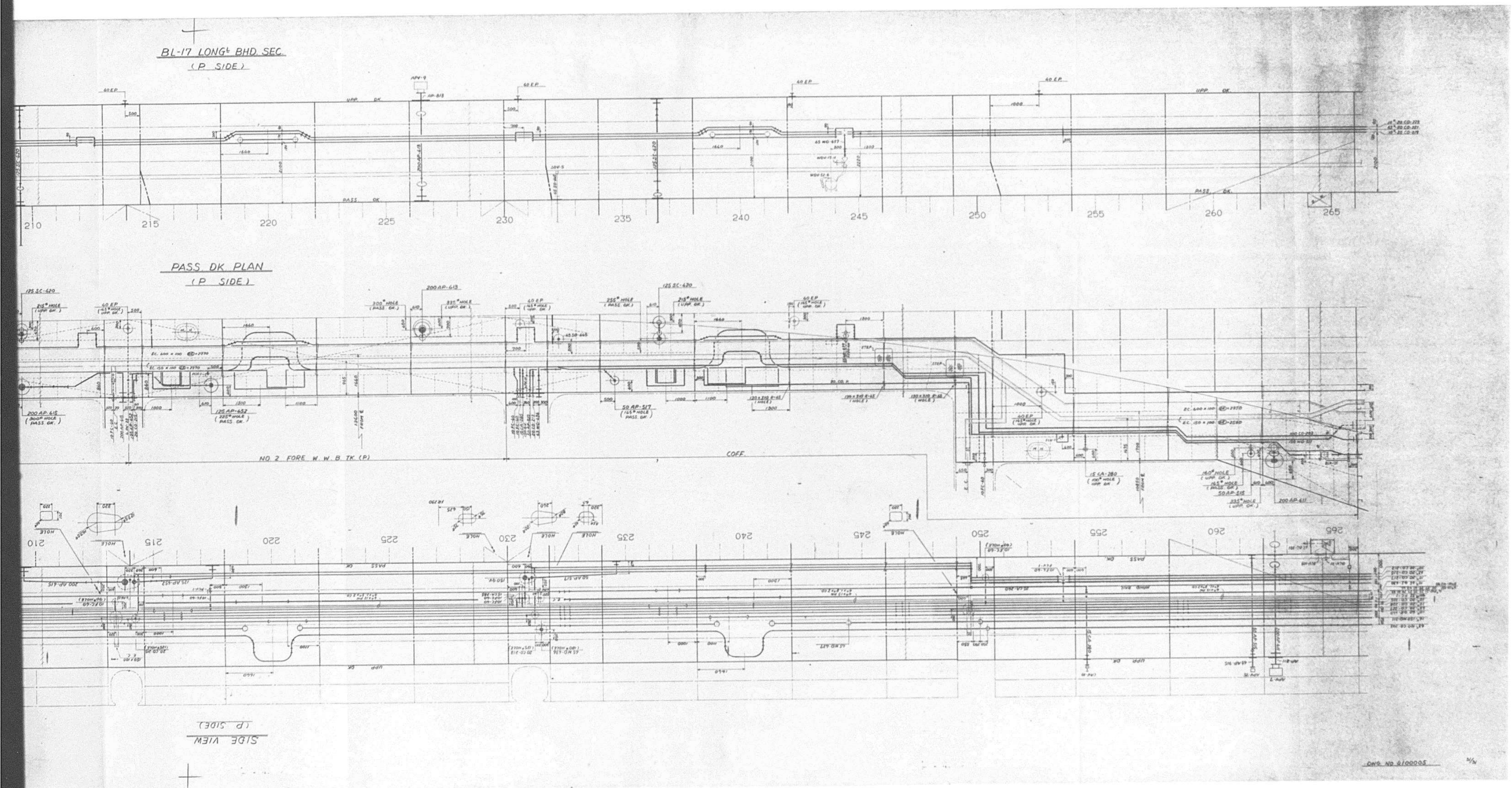


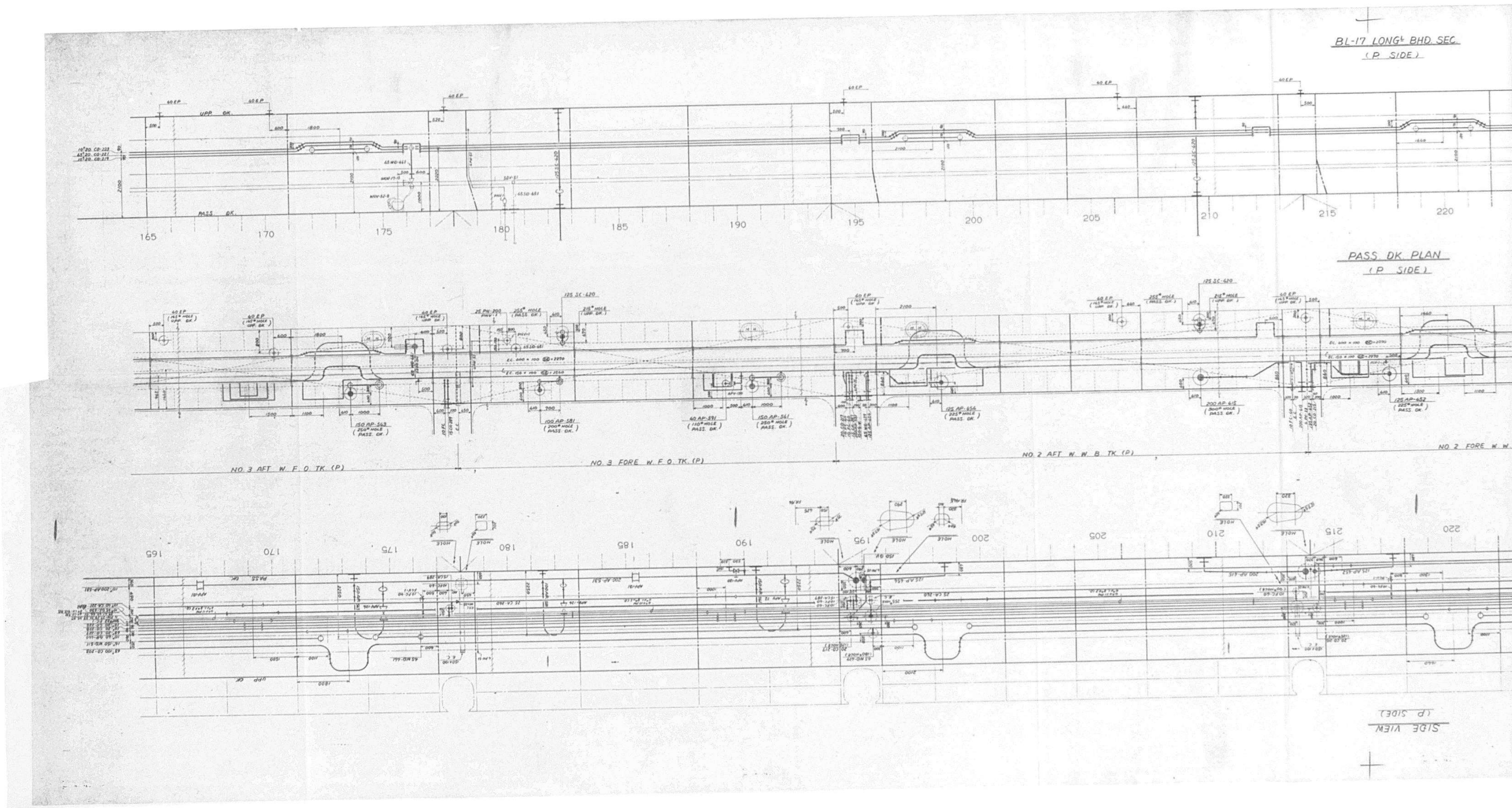
BL-17 LONG'L BHD. SEC.
(S. SIDE)
PASS. DK. PLAN
(S. SIDE)
NO. 2 FORE W. W. B. TK (S)
COFF.
SIDE VIEW
(S. SIDE)
DWG. NO. 6100005

1511



BL-17 LONG'L BHD
(S. SIDE)
UPP DK
PASS DK
165
170
175
180
185
190
195
200
205
210
215
220
HOLE
PASS DK PLAN
(S. SIDE)
NO. 3 AFT W. F. O. TK. (S)
NO 3 FORE W. F. O. TK. (S)
NO. 2 AFT W. W. B. TK. (S)
NO 2 FORE W. W. B.


BL-17 LONG'L BHD. SEC.
(P SIDE)
PASS. DK PLAN
(P SIDE)
NO 2 FORE W. W. B TK (P)
COFF


BL-17 LONGL BHD. SEC.
(P SIDE)
UPP DK
PASS DK
PASS DK PLAN
(P SIDE)
NO. 3 AFT W. F. O. TK (P)
NO. 3 FORE W. F. O. TK (P)
NO. 2 AFT W. W. B. TK (P)
NO. 2 FORE W. W. B
165
170
175
180
185
190
195
200
205
210
215
220

1/2 1514

APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY28'85	DFTS/MES/458			MAY31'85	T-8-2		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC.(PIPING)

パイプパッセージ諸管配置（後部）

PIPING ARRANGEMENT UNDER UPP.DK.PASSAGE
(AFT PART)

3/3

DATE (TEL 2240)

JOB NO. TS1323/24/25 — SCALE 1/20, 1/50 — LYKES REF. NO. 48000 4 — MITSUI DRAWING NO. 4100005

(27 SHEETS WITH COVER)

1/27

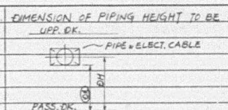
PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN. MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG NO. 4100005 2/27

GENERAL NOTE

1 DIMENSION OF PIPING HEIGHT TO BE SHOWN AS FOLLOWING FIGURE.



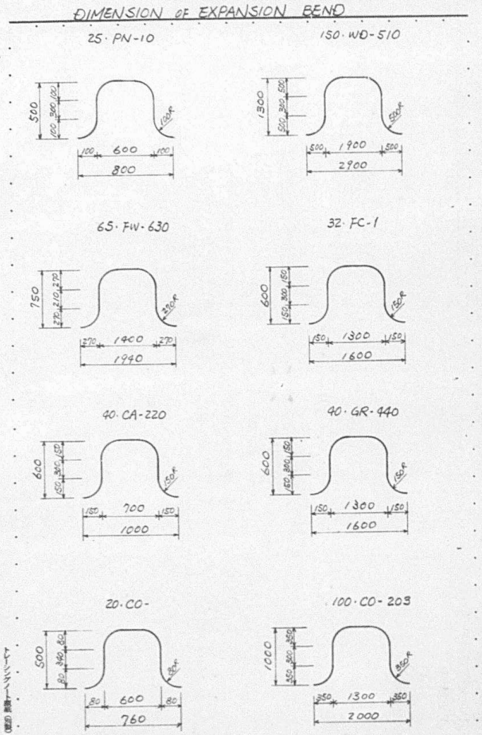
DWG.NO. 4100005 3/27

PIPE LIST

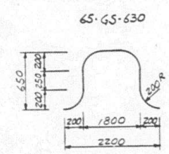
MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

DWG. NO. 4100005 4/27

DIMENSION OF EXPANSION BEND

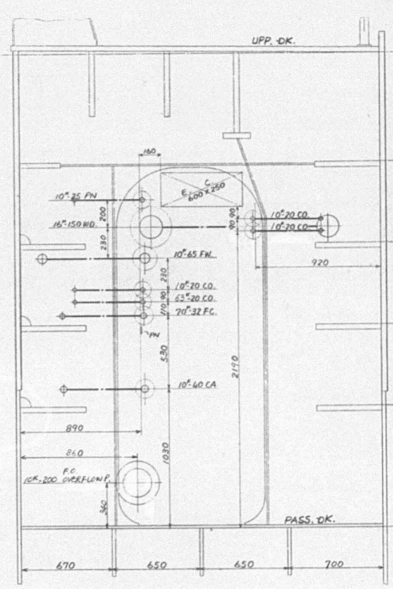


DWG. NO. 4100005 5/27



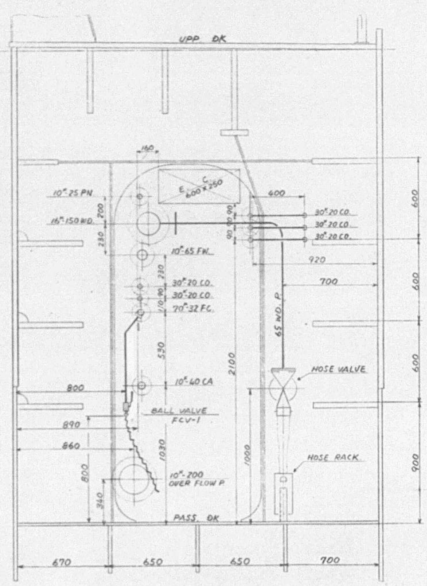
DWG. NO. 4100005 6/27

TYPICAL SECTION
LOOKING FORE
S. SIDE



DWG. NO. 4100005 7/27

10·FC & 65·WD BRANCH SECTION
LOOKING FWD.
S. SIDE



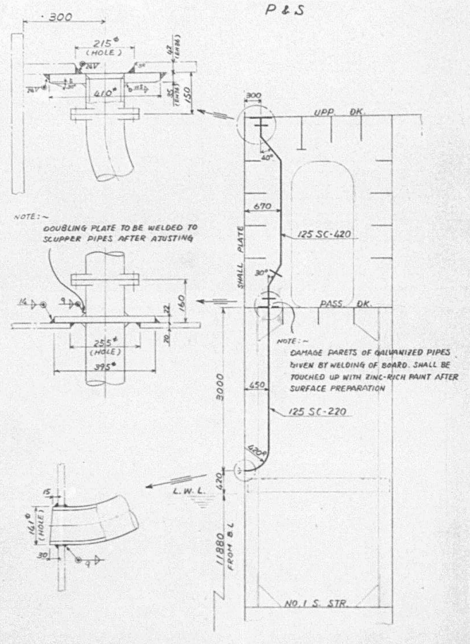
DWG. NO. 4100005 8/27

1516

SCUPPER PIPE

FR 114 ½, 145 ½

P & S

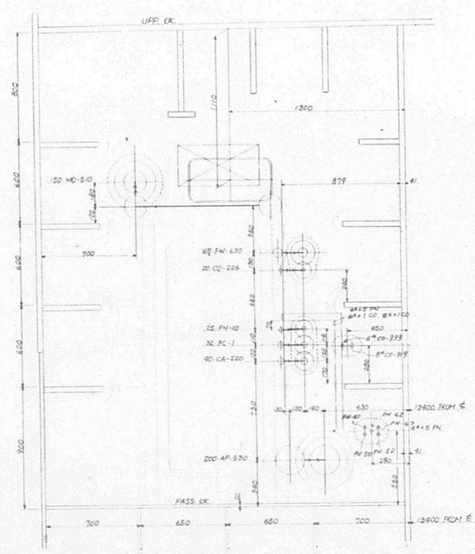


DWG. NO. 4100005 9/27

FR. 84

LOOKING AFT

S. SIDE

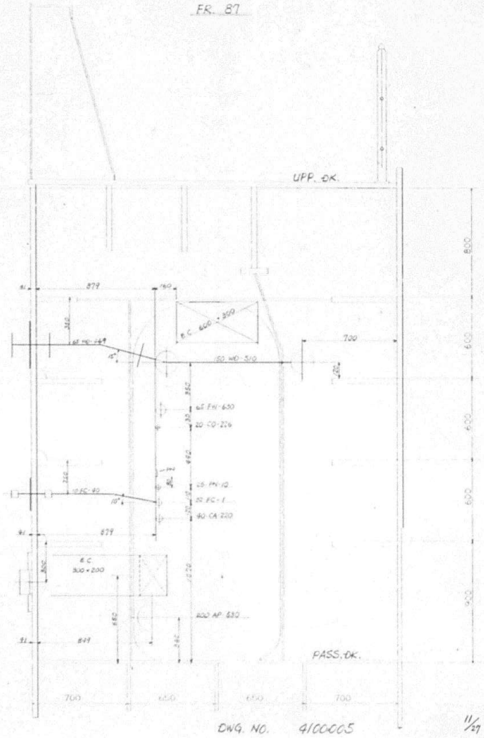


DWG. NO. 4100005 10/27

STBD. SIDE SECTION

LOOKING FWD.

FR. 87

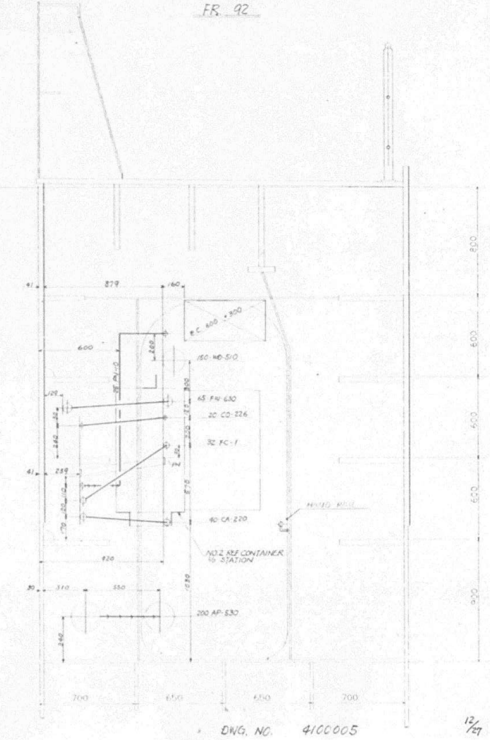


DWG. NO. 4100005 11/27

STBD. SIDE SECTION

LOOKING FWD.

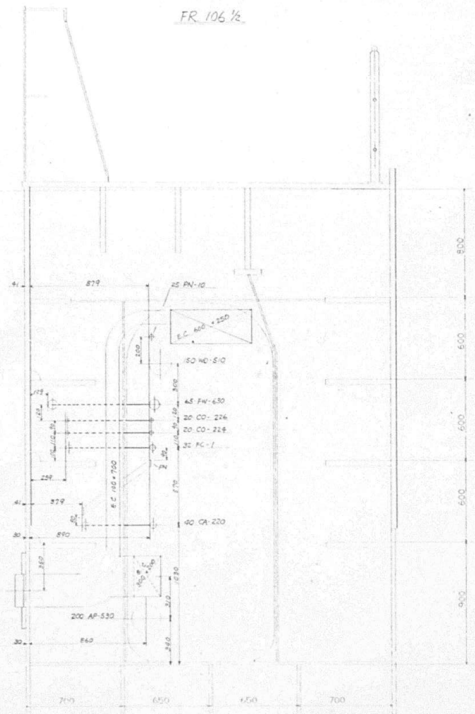
FR. 92



DWG. NO. 4100005 12/27

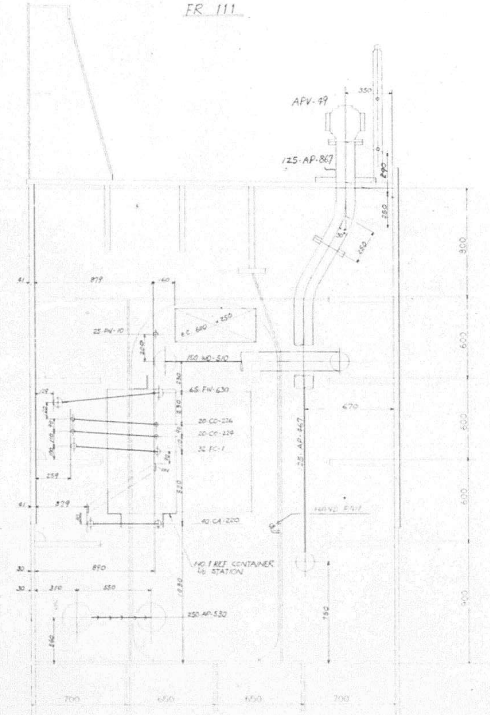
1517

STBD. SIDE SECTION
LOOKING FWD.
FR 106 ½



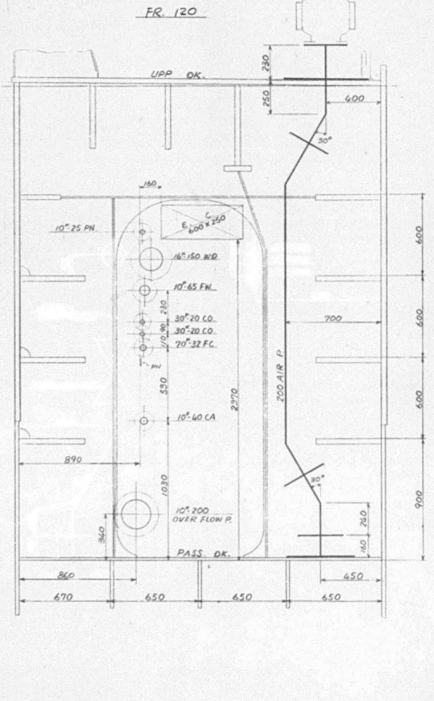
DWG. NO. 4100005 13/27

STBD. SIDE SECTION
LOOKING FWD.
FR 111



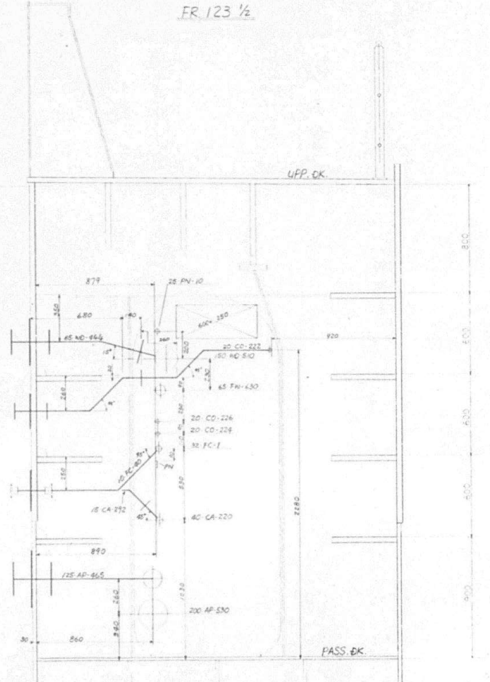
DWG. NO. 4100005 14/27

STBD. SIDE SECTION
LOOKING FWD.
FR. 120



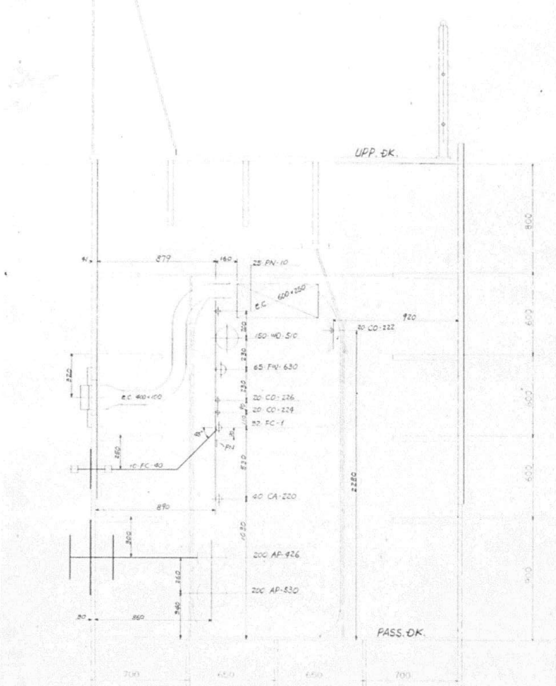
DWG. NO. 4100005 15/27

STBD. SIDE SECTION
LOOKING FWD.
FR 123 ½



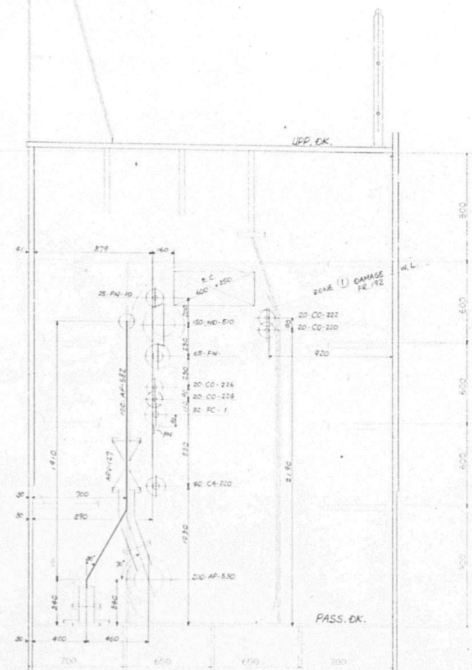
DWG. NO. 4100005 16/27

STBD. SIDE SECTION
LOOKING FWD.
FR. 142 ½



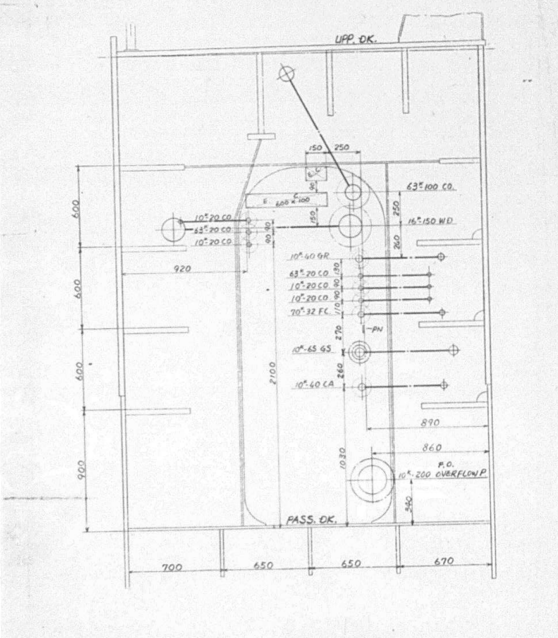
DWG. NO. 4100005 17/27

STBD. SIDE SECTION
LOOKING FWD.
FR. 165



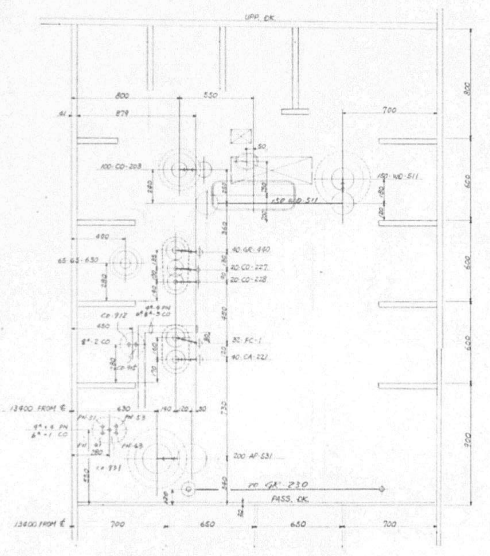
DWG. NO. 4100005 18/27

TYPICAL SECTION
LOOKING FORE
P. SIDE

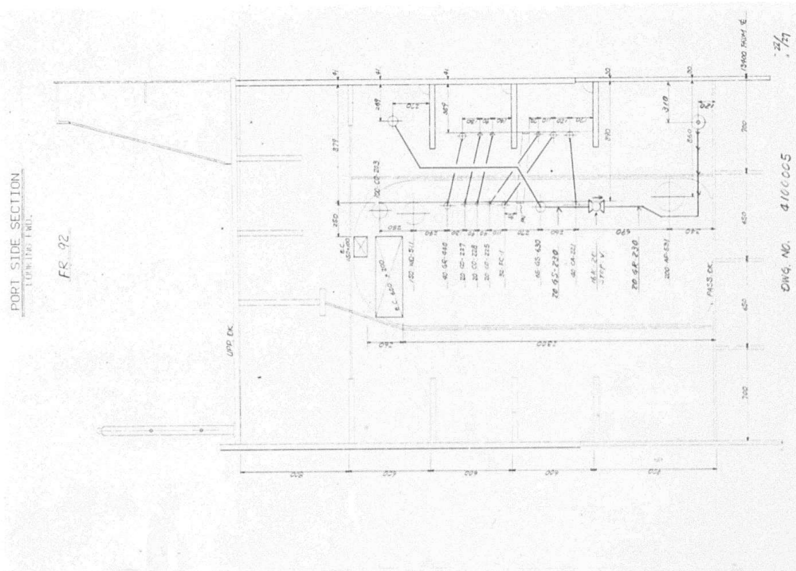


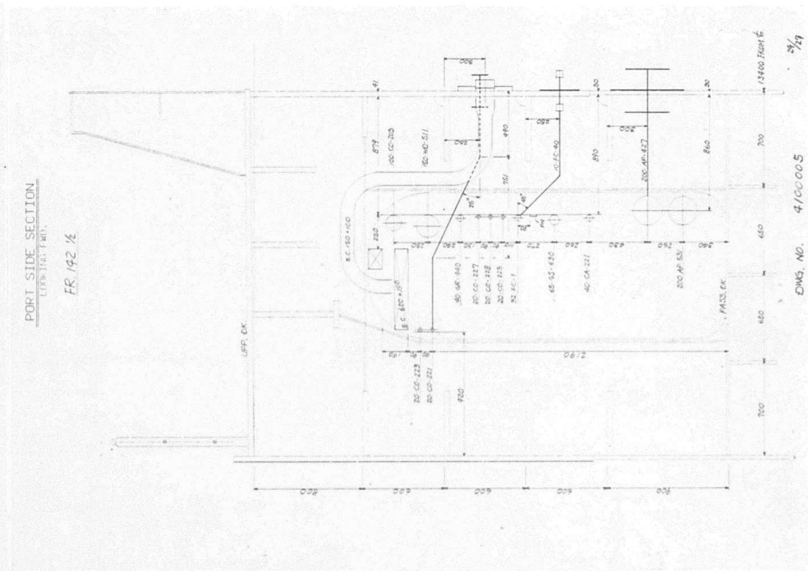
DWG. NO. 4100005 . 19/27

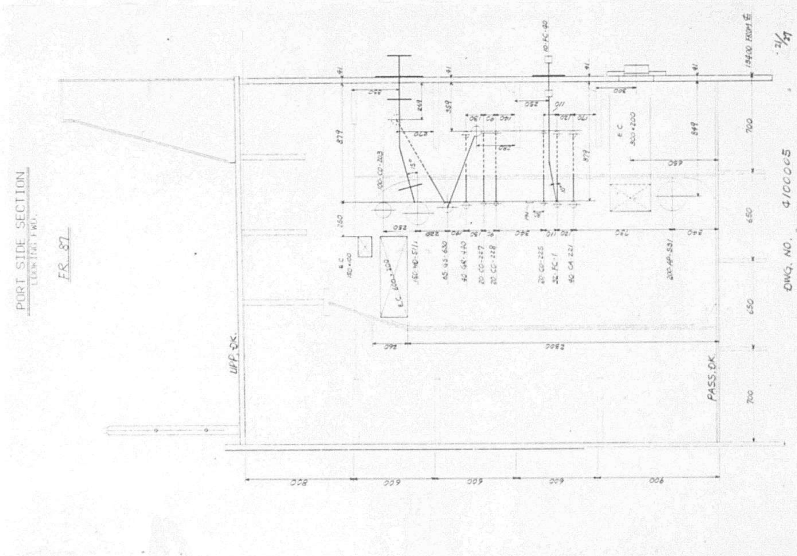
FR. 84
LOOKING AFT
P. SIDE

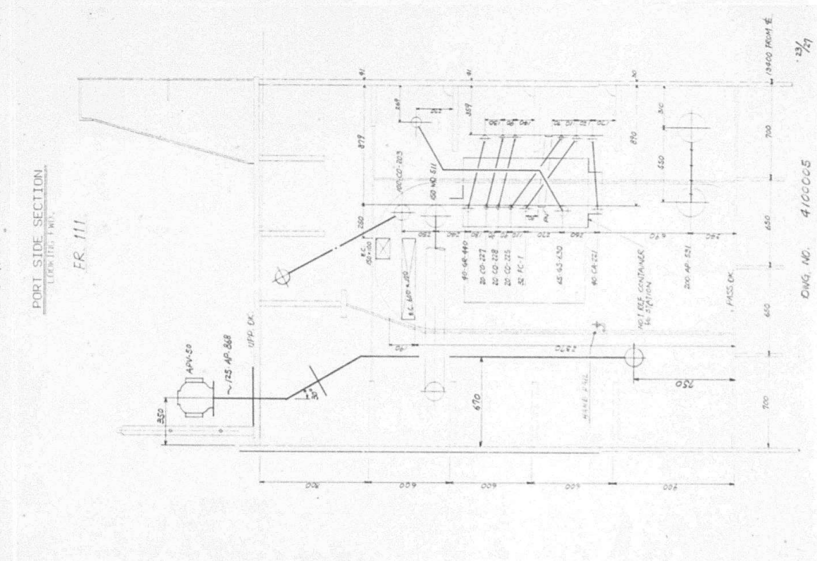


DWG. NO. 4100005 20/27


PORT SIDE SECTION
FR. 92
UPP. DK.
PASS. DK.
DWG. NO. 4100005


PORT SIDE SECTION
FR. 142 ½
UPP. DK.
PASS. DK.
DWG. NO. 4100005

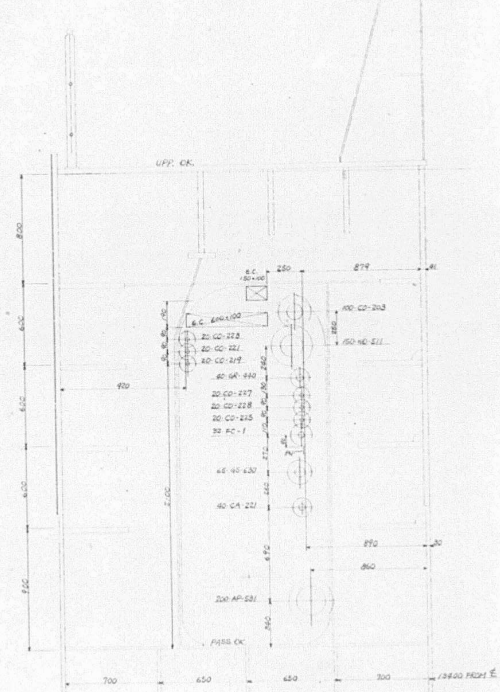

PORT SIDE SECTION
FR. 87
UPP. DK.
PASS. DK.
DWG. NO. 4100005


PORT SIDE SECTION
FR. 111
UPP. DK.
PASS. DK.
DWG. NO. 4100005

1520

PORT SIDE SECTION
LOOKING FWD.

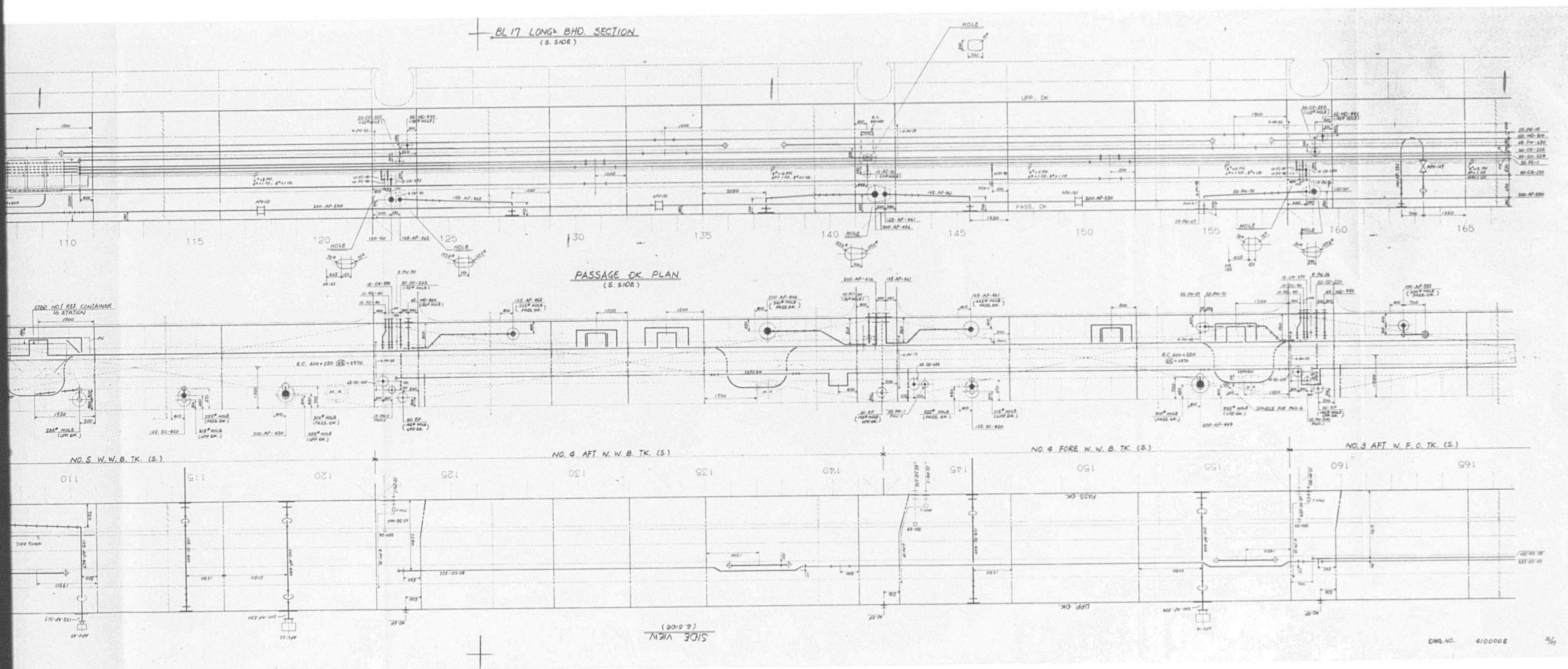
FR 165



DWG. NO. 4100005

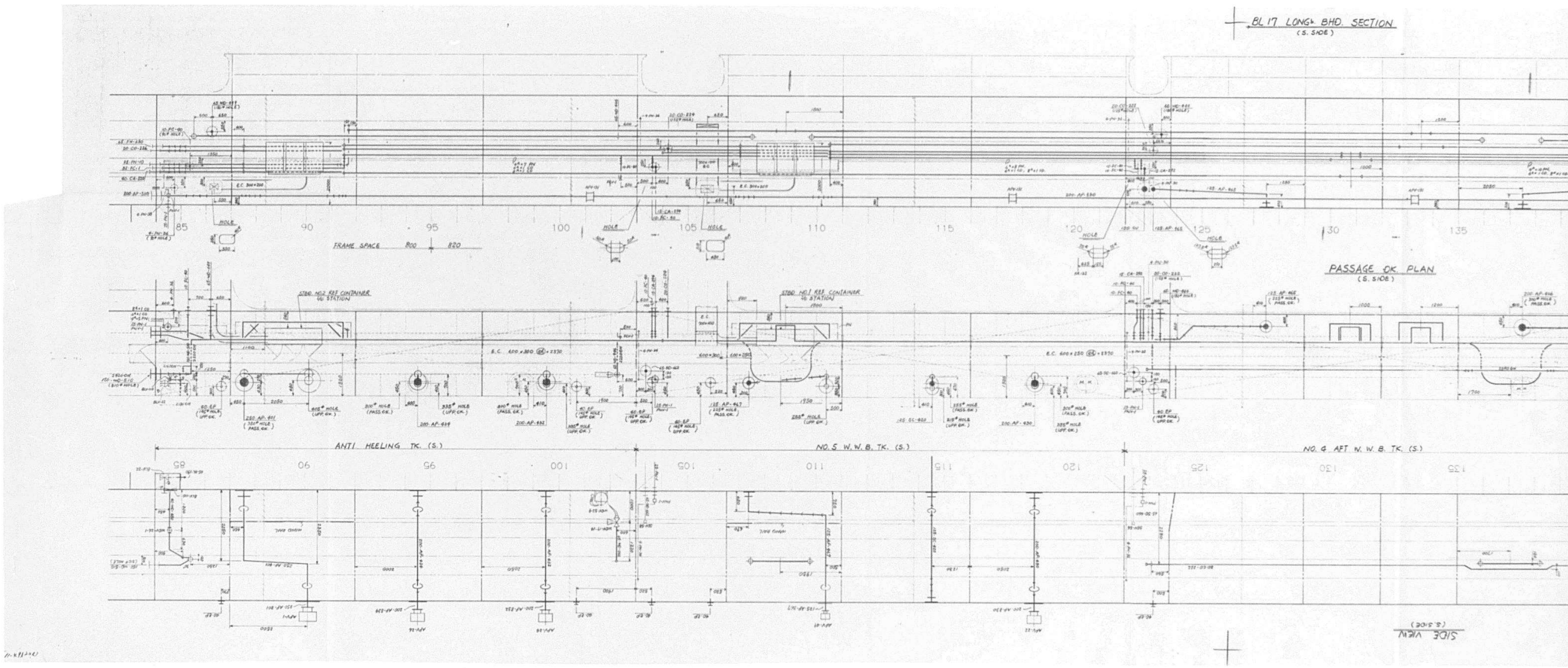
25/37

1521



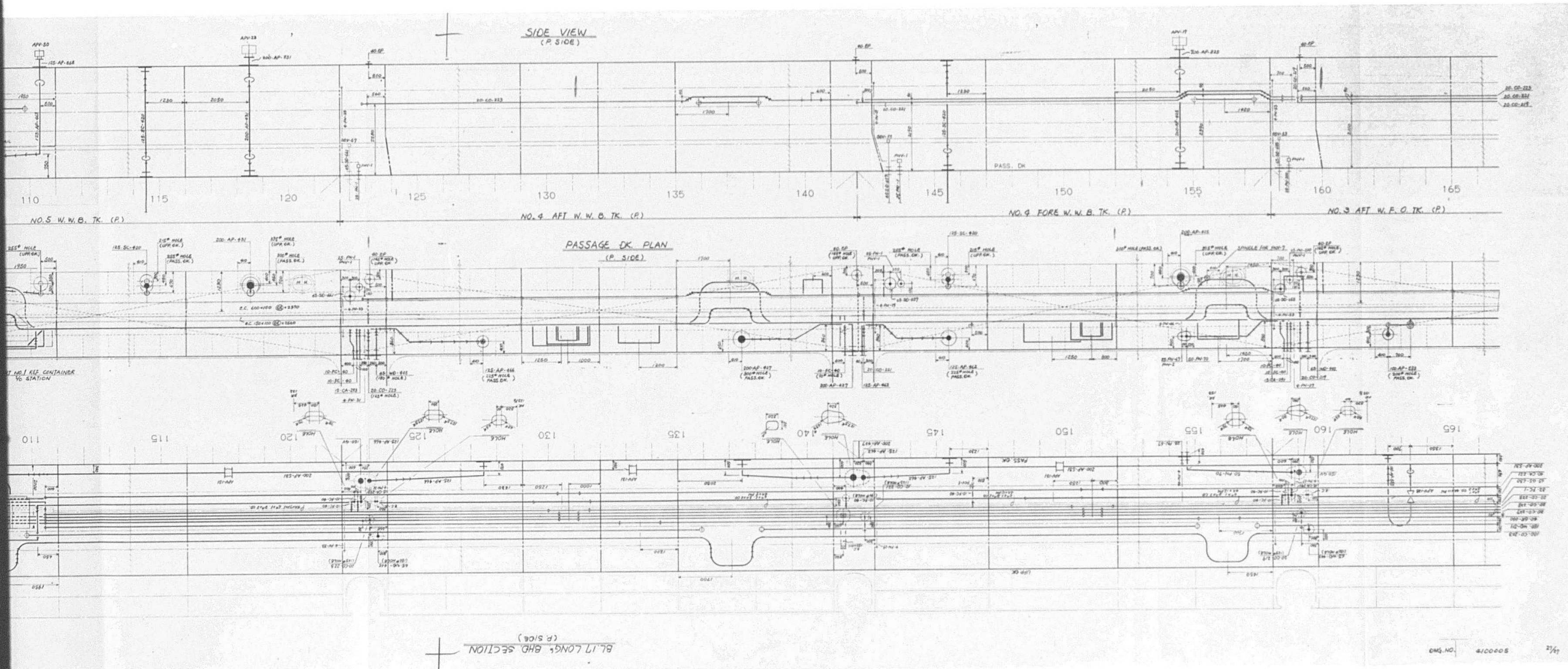
BL 17 LONG'L BHD SECTION
(S. SIDE)
PASSAGE DK. PLAN
(S. SIDE)
NO. 5 W. W. B. TK. (S.)
NO. 4 AFT W. W. B. TK. (S.)
NO. 4 FORE W. W. B. TK. (S.)
NO. 3 AFT W. F. O. TK. (S.)
SIDE VIEW
(S. SIDE)
DWG. NO. 410008

1522

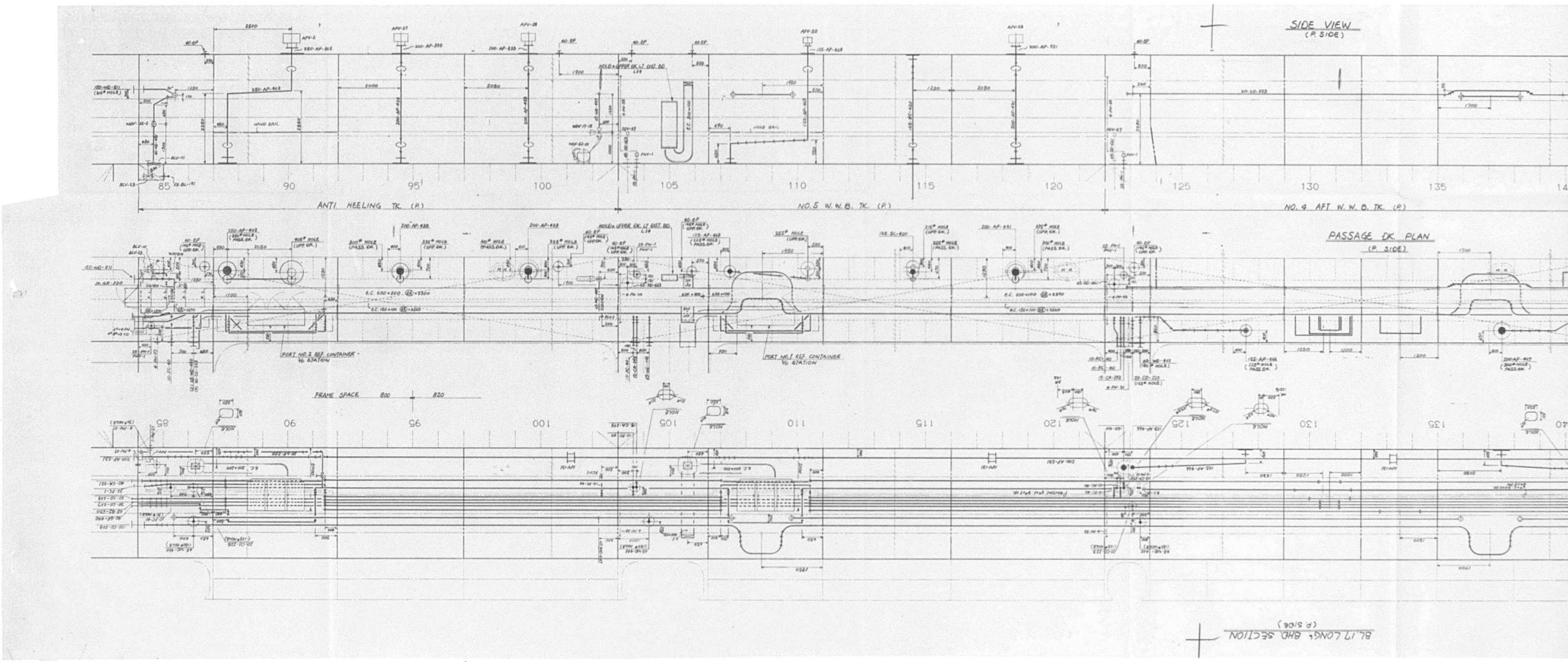


BL 17 LONG'L BHD. SECTION
(S. SIDE)
FRAME SPACE 800 820
PASSAGE DK. PLAN
(S. SIDE)
ANTI HEELING TK. (S.)
NO. 5 W. W. B. TK. (S.)
NO. 6 AFT W. W. B. TK. (S.)
SIDE VIEW
(S. SIDE)

2/2 1523


SIDE VIEW
(P. SIDE)
NO.5 W.W.B. TK. (P)
NO.4 AFT W.W.B. TK. (P)
NO.4 FORE W.W.B. TK. (P)
NO.3 AFT W.F.O. TK. (P)
PASSAGE DK. PLAN
(P. SIDE)
PASS. DK
ENG. NO.

1524


SIDE VIEW
(P. SIDE)
ANTI HEELING TK (P)
NO.5 W.W.B. TK (P)
NO.4 AFT W.W.B. TK (P)
PASSAGE DK PLAN
(P. SIDE)
PORT NO.2 REF CONTAINER STATION
PORT NO.1 REF CONTAINER STATION
FRAME SPACE 800 820
85
90
95
100
105
110
115
120
125
130
135
140

2/2

1525

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY 2 '85	OFTS/MES-430			MAY 2 '85	T-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		~~MITSUBISHI KOBE~~	
NO.1323	DOCTOR LYKES	~~NO.1158~~	~~JAMES LYKES~~
NO.1324	ALMERIA LYKES	~~NO.1159~~	~~JOSEPH LYKES~~
NO.1325	TILLIE LYKES	~~NO.1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER | SHIP'S NO. | SHIP'S NAME: TILLIE LYKES

OUTFIT. DESIGN SEC.(PIPING) SEC.CHIEF

操舵機室諸管配置

PIPING ARRANGEMENT IN STEERING GEAR ROOM (INC. AFT PUMP UNITS)

DATE MAR. 25 '85 (TEL 2240)
JOB NO. TS1323/24/25
SCALE 1/50
LYKES REF. NO. 480007
MITSUI DRAWING NO. 4100025

(7 SHEETS WITH COVER)

1/7

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG NO 4100025 2/7

GENERAL NOTE

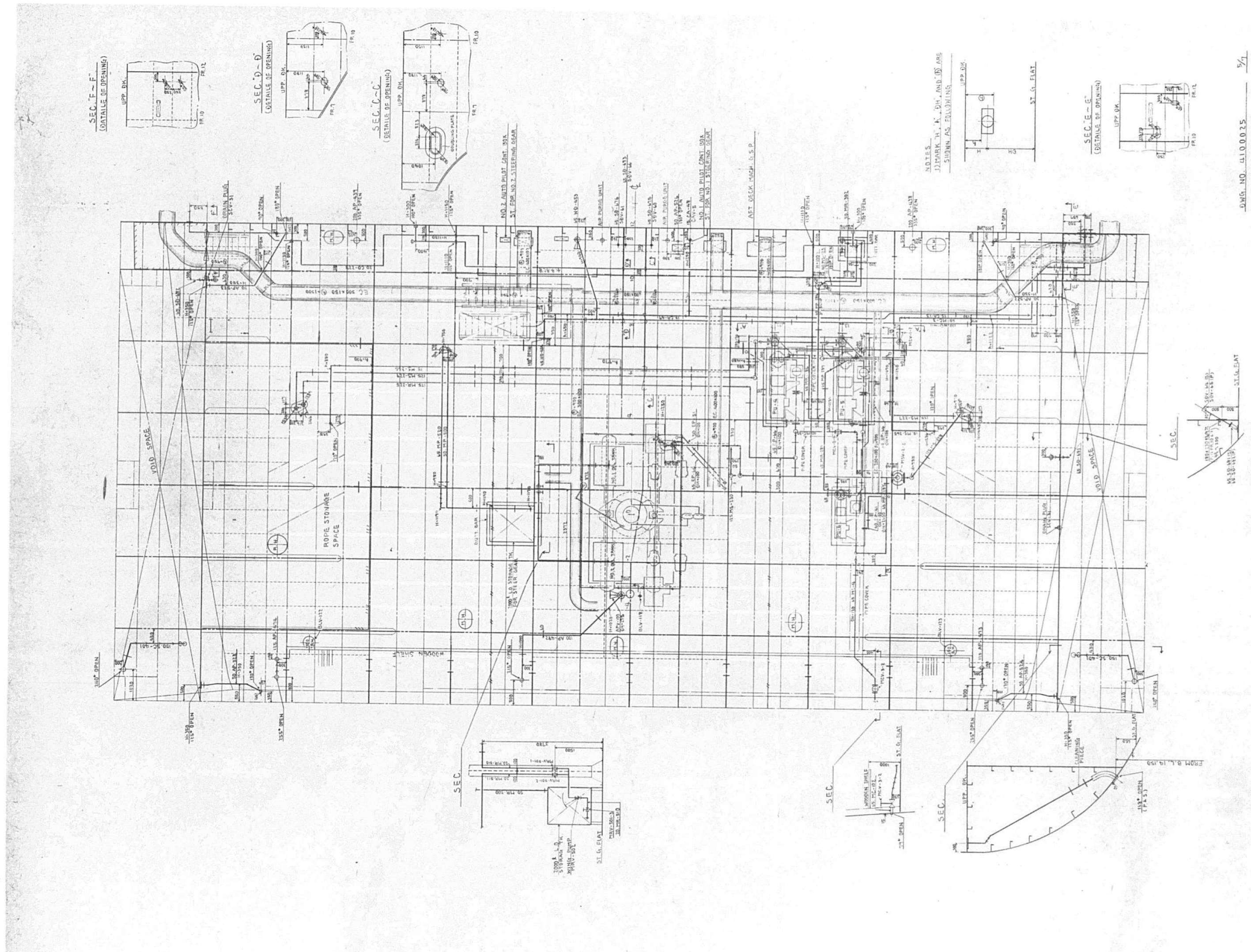
DWG.NO. 4100025 3/7

PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

DWG NO. 4100025 4/7

1526

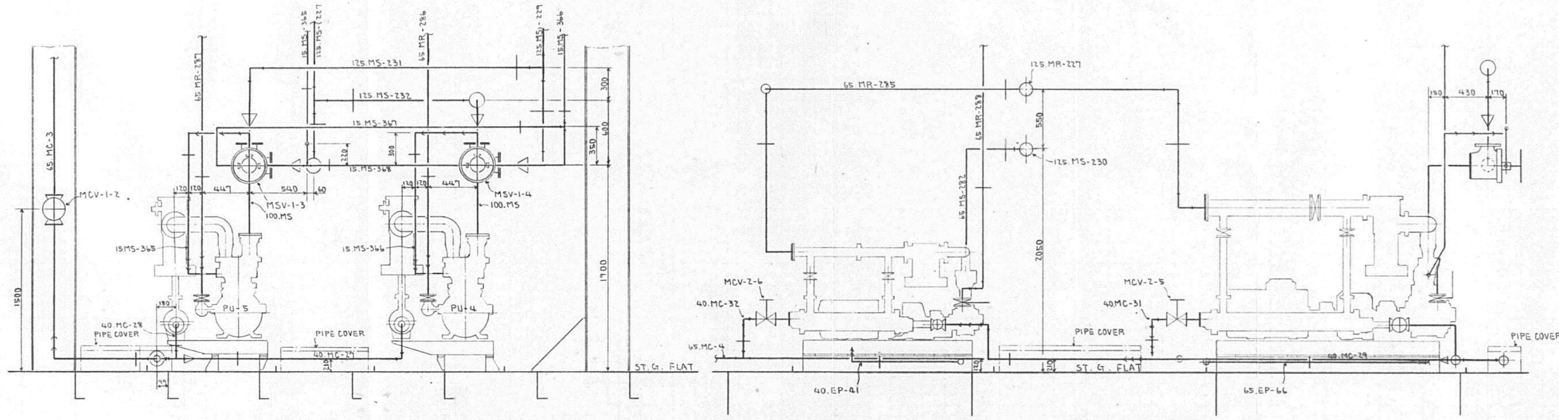


SEC "F-F" (DETAILS OF OPENING)
SEC "D-D" (DETAILS OF OPENING)
SEC "C-C" (DETAILS OF OPENING)
SEC "G-G" (DETAILS OF OPENING)
ROPE STOVAGE SPACE
VOID SPACE
DWG. NO. 4100025
5/7

1527

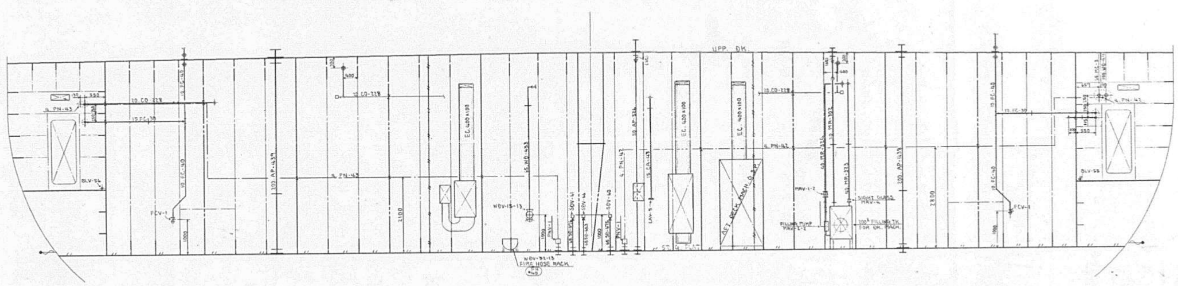
SEC. "A ~ A"
(SCALE 1/25)

SEC. "B ~ B"
(SCALE 1/25)



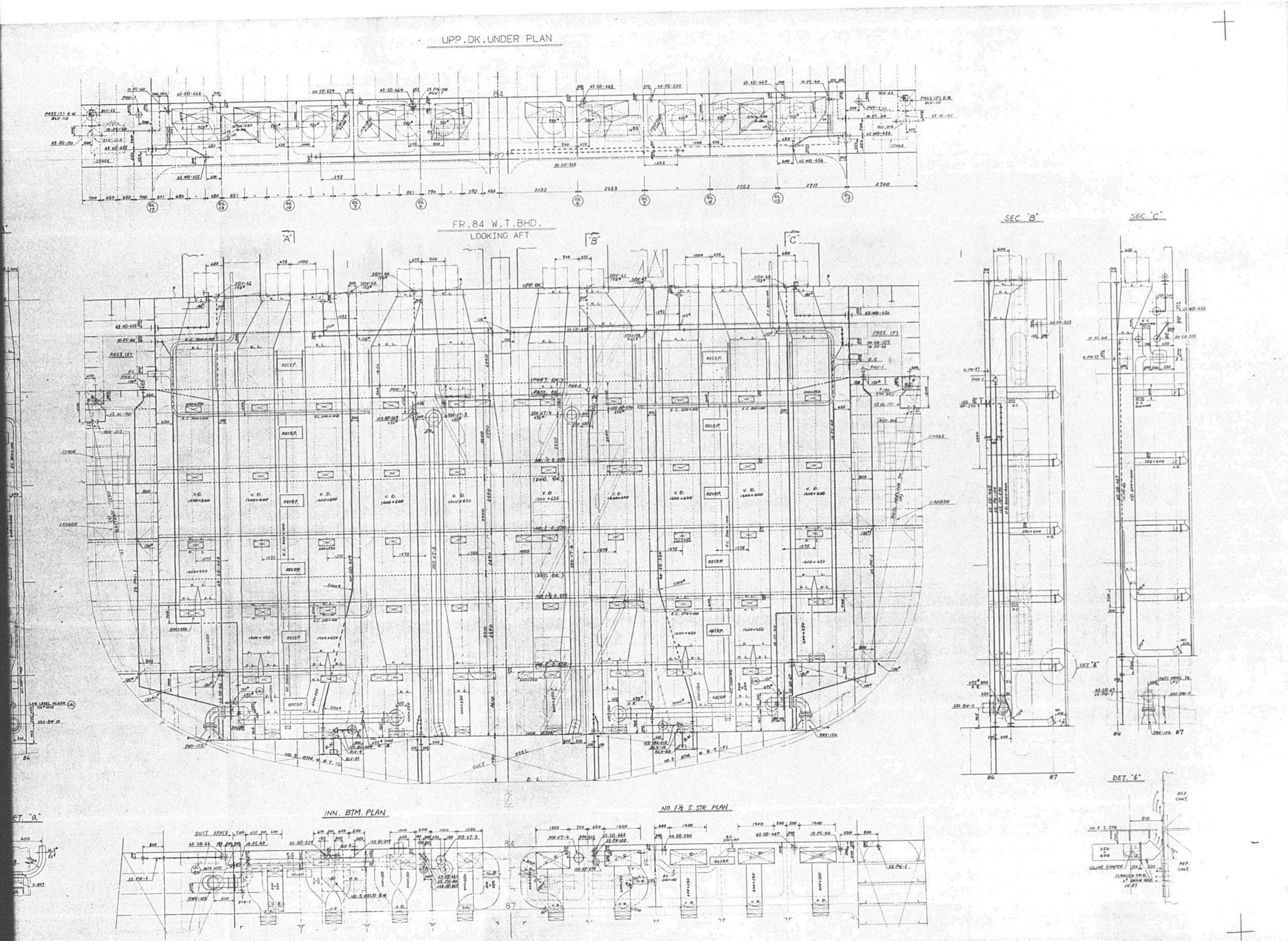
DWG. NO. 4100025 6/7

FR. 12
(LOOKING FORE)



DWG. NO. 4100025 7/7

1529



PLAN RECORD			
ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN. MADE APPLICABLE TO S1324 AND S1325.	JULY 2'86

GENERAL NOTE	
1	REFERENCE DWG.
	1) PIPING ARR. IN DOUBLE BTM TK INCLUDING DUCT KEEL (DWG NO. 4100050, 51)
	2) PIPING ARR. UNDER DECK PASSAGE (DWG NO. 4100005)
	3) PIPING ARR. ON UPPER DECK (DWG NO. 4100001)

APPROVAL OF OWNER & REGULATORY BODIES						
ALT. NO.	OWNER		ABS			
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 27 '85	OPTS/MES-457	AUG 22 '85	T-8-2		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

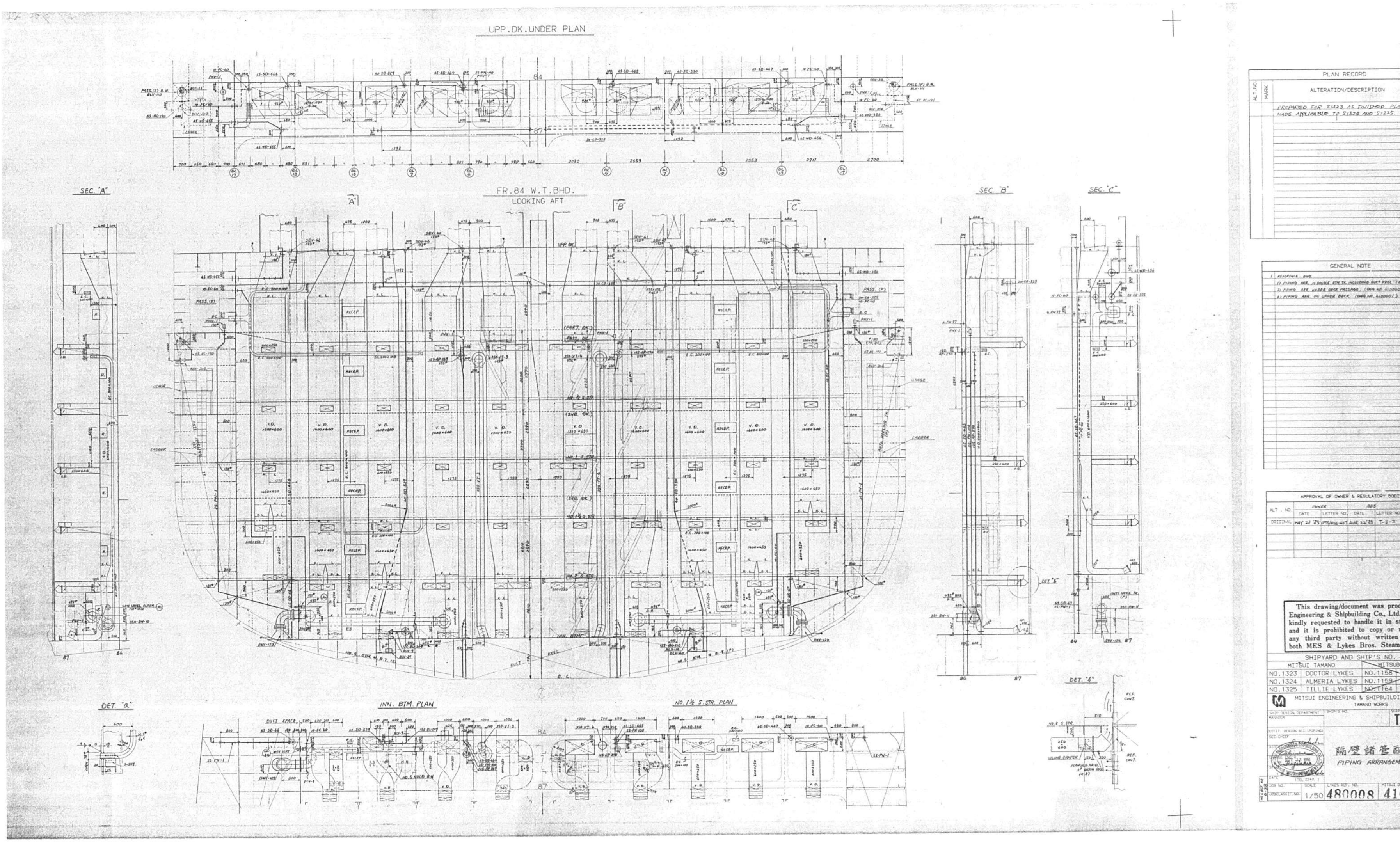
MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP'S NAME: TILLIE LYKES

隔壁諸管配置 (FR.84)
PIPING ARRANGEMENT ON BHD. (1/4)

SCALE: 1/50 | LYKES REF. NO.: 480008 | MITSUI DRAWING NO.: 4100030

1/2 1530


UPP.DK.UNDER PLAN
FR.84 W.T.BHD.
LOOKING AFT
SEC."A"
SEC."B"
SEC."C"
DET."A"
DET."B"
INN. BTM. PLAN
NO.1½ S.STR PLAN
PLAN RECORD
ALT.NO.
MARK
ALTERATION/DESCRIPTION
PREPARED FOR S1323 AS FINISHED PLAN
MADE APPLICABLE TO S1324 AND S1325.
GENERAL NOTE
APPROVAL OF OWNER & REGULATORY BODIES
ALT. NO.
OWNER
ABS
DATE
LETTER NO.
ORIGINAL
This drawing/document was produc
Engineering & Shipbuilding Co., Ltd. (M
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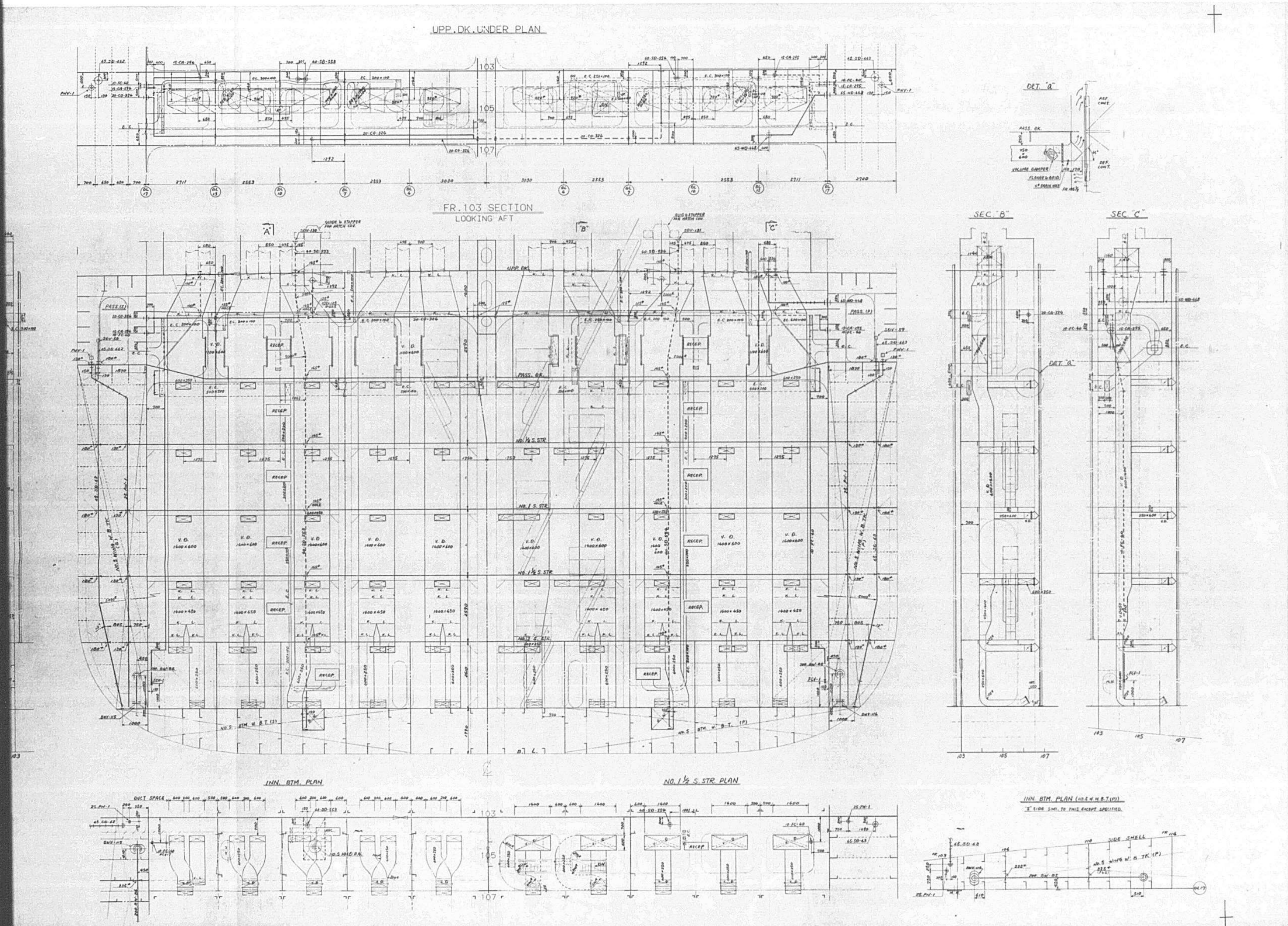
any third party without written p
both MES & Lykes Bros. Steamshi
SHIPYARD AND SHIP'S NO. &
MITSUI TAMANO
MITSUBIS
NO.1323 DOCTOR LYKES NO.1158
NO.1324 ALMERIA LYKES NO.1159
NO.1325 TILLIE LYKES NO.1164
MITSUI ENGINEERING & SHIPBUILDING
TAMANO WORKS
SHIP DESIGN DEPARTMENT
MANAGER
SHIP'S NO.
TIL
隔壁諸管配
PIPING ARRANGEMENT
SCALE
1/50
LYKES REF. NO.
480008
410

2/2

1531



PLAN RECORD			
ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN. MADE APPLICABLE TO S1324 AND S1325.	JULY 2 '86

GENERAL NOTE

1 REFERENCE DWG.
1) PIPING ARR. IN DOUBLE BTM. TK. INCLUDING DUCT KEEL (DWG. NO. 4100050.51)
2) PIPING ARR. UNDER UPPER DECK PASSAGE (DWG. NO. 4100005)
3) PIPING ARR. ON UPPER DECK (DWG. NO. 4100001)

2 BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 23 '85	OFTS/MES-437	AUG 26 '85	T-8-2		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

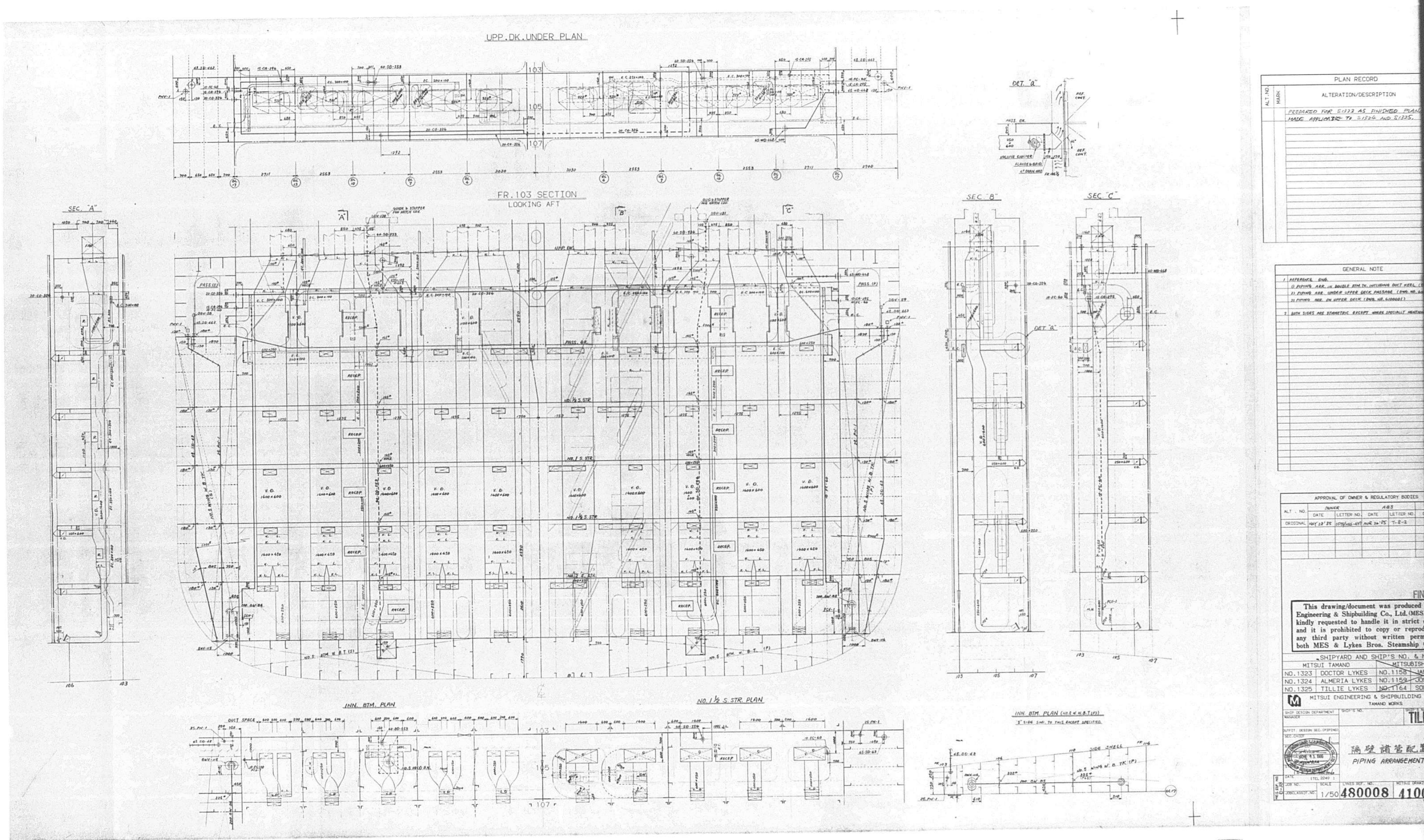
SHIP'S NAME: TILLIE LYKES

隔壁諸管配置 (FR.103)
PIPING ARRANGEMENT ON BHD. (34)

SCALE 1/50
LYKES REF. NO. 480008
MITSUI DRAWING NO. 4100030

1/2

1532



UPP. DK. UNDER PLAN
FR. 103 SECTION
LOOKING AFT
SEC. "A"
SEC. "B"
SEC. "C"
DET. "a"
INN. BTM. PLAN
NO. 1½ S. STR. PLAN
PLAN RECORD
ALTERATION/DESCRIPTION
GENERAL NOTE
APPROVAL OF OWNER & REGULATORY BODIES
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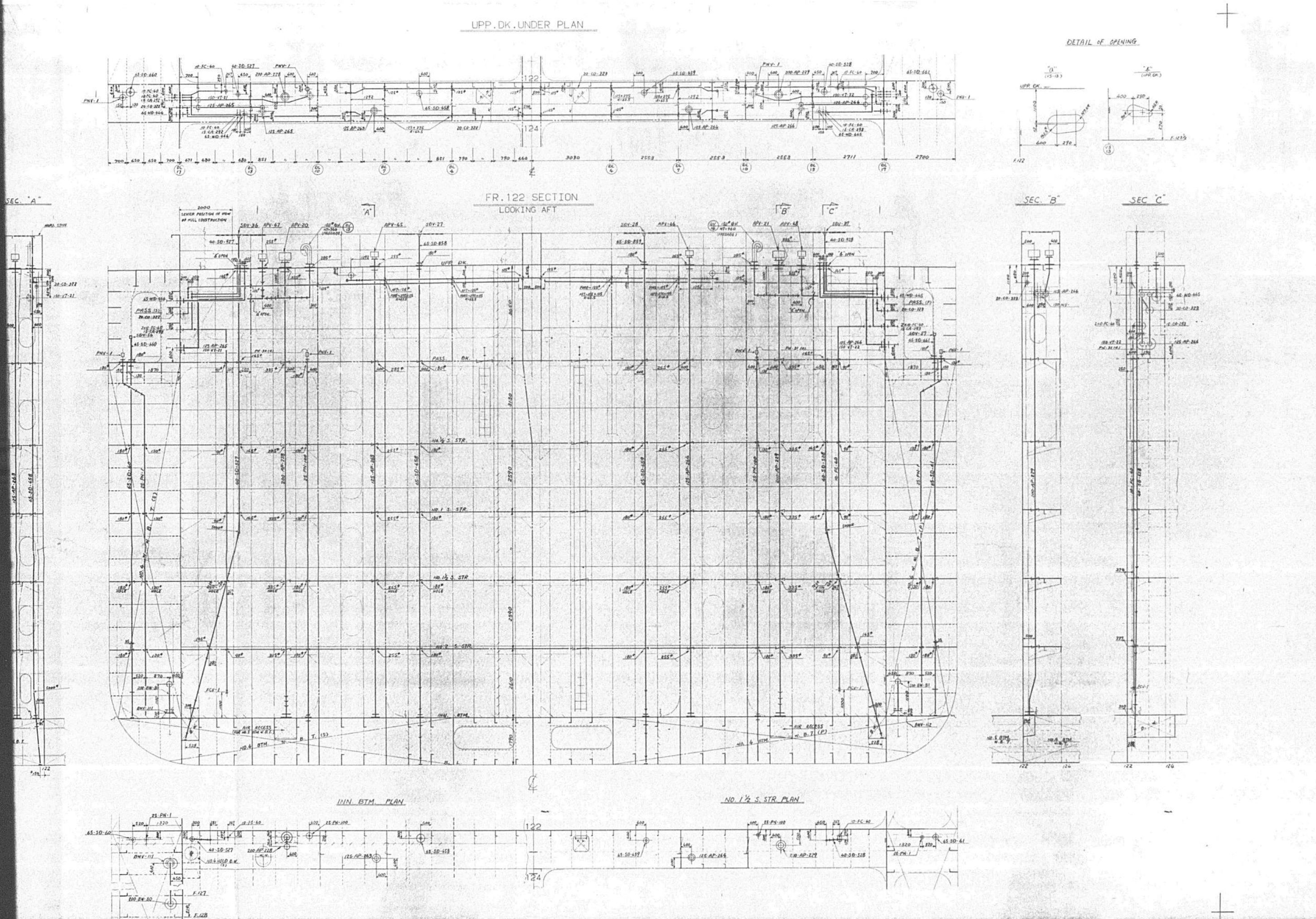
any third party without written perm
both MES & Lykes Bros. Steamship
SHIPYARD AND SHIP'S NO. & N
MITSUI TAMANO
MITSUBISHI
NO. 1323 DOCTOR LYKES NO. 1158
NO. 1324 ALMERIA LYKES NO. 1159
NO. 1325 TILLIE LYKES NO. 1164
MITSUI ENGINEERING & SHIPBUILDING
TAMANO WORKS
SHIP DESIGN DEPARTMENT
MANAGER
SHIP'S NO.
TILL
OUTFIT. DESIGN SEC. (PIPING)
SEC. CHIEF
隔壁諸管配置
PIPING ARRANGEMENT
DATE
JOB NO.
JOB CLASSIF. NO.
SCALE
1/50
LYKES REF. NO.
480008
MITSUI DRAWING
4100

2/2

1533



PLAN RECORD			
ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN MADE APPLICABLE TO S1324 AND S1325.	JULY 2 '86

GENERAL NOTE	
1	REFERENCE DWG.
	1) PIPING ARR. IN DOUBLE BTM TK. INCLUDING DUCT KEEL (DWG NO. 4100050, 51)
	2) PIPING ARR. UNDER UPPER DECK PASSAGE (DWG NO. 4100005)
	3) PIPING ARR. ON UPPER DECK. (DWG NO. 4100001)
2	BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.

APPROVAL OF OWNER & REGULATORY BODIES						
ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 28 '85	OFTS/HKK-097	AUG 22 '85	T-8-2		

FINISHED PLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO. 1323	DOCTOR LYKES	NO. 1158	JAMES LYKES
NO. 1324	ALMERIA LYKES	NO. 1159	JOSEPH LYKES
NO. 1325	TILLIE LYKES	NO. 1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

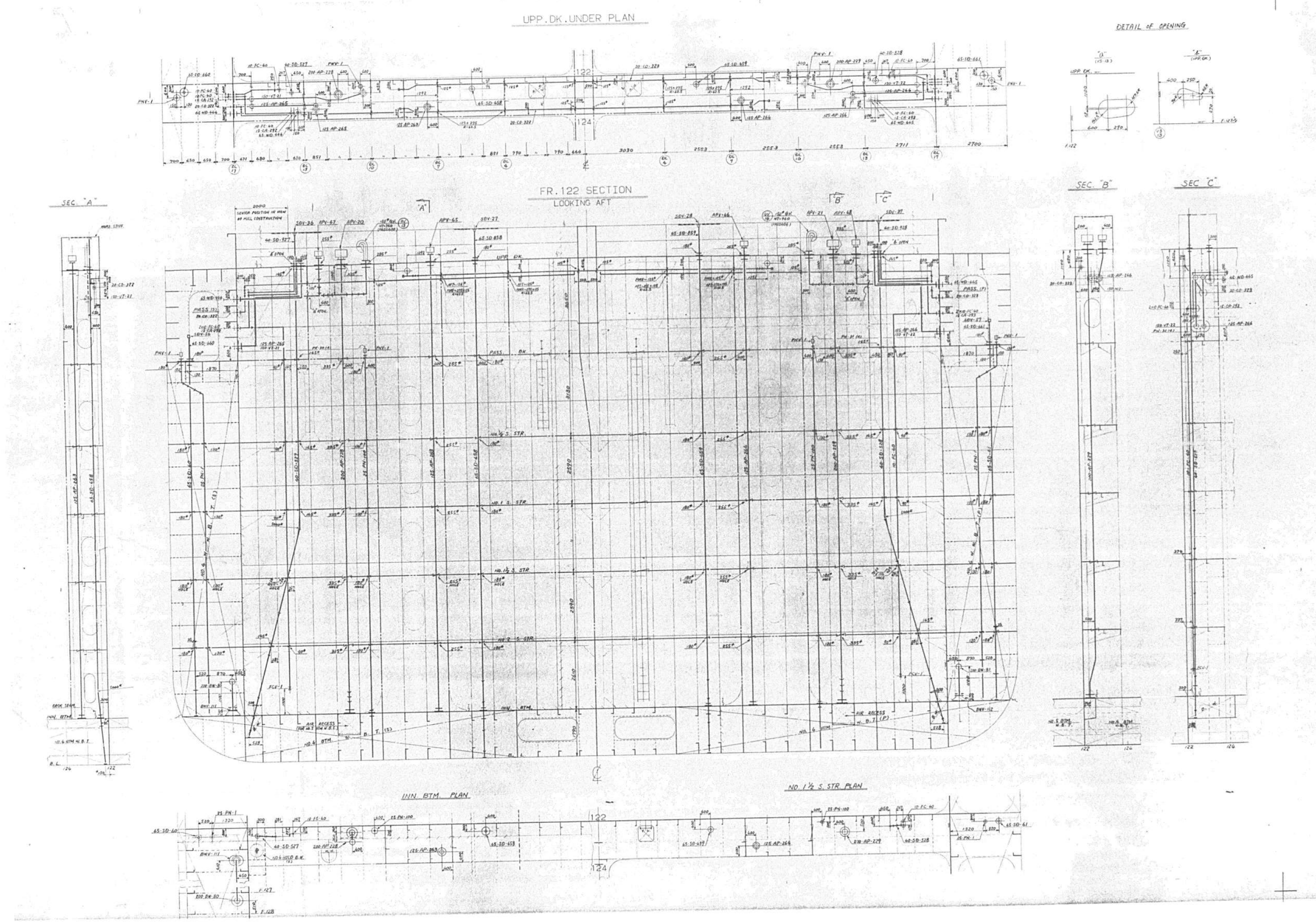
SHIP'S NAME: TILLIE LYKES

隔壁諸管配置(FR.122)
PIPING ARRANGEMENT ON BHD. (34)

SCALE 1/50 — LYKES REF. NO. 480008 — MITSUI DRAWING NO. 4100030

1/2

1534



PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN. MADE APPLICABLE TO S1324 AND S1325.	JULY 2 '86

GENERAL NOTE

1. REFERENCE DWG.
   1) PIPING ARR. IN DOUBLE BTM TK. INCLUDING DUCT KEEL (DWG. NO. 6100050, 51)
   2) PIPING ARR. UNDER UPPER DECK PASSAGE (DWG. NO. 6100051)
   3) PIPING ARR. ON UPPER DECK. (DWG. NO. 6100001)
2. BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 28 '85	OFTS/MES-097	AUG. 22 '85	T-8-2		

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO. 1323	DOCTOR LYKES	NO. 1158	JAMES LYKES
NO. 1324	ALMERIA LYKES	NO. 1159	JOSEPH LYKES
NO. 1325	TILLIE LYKES	NO. 1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

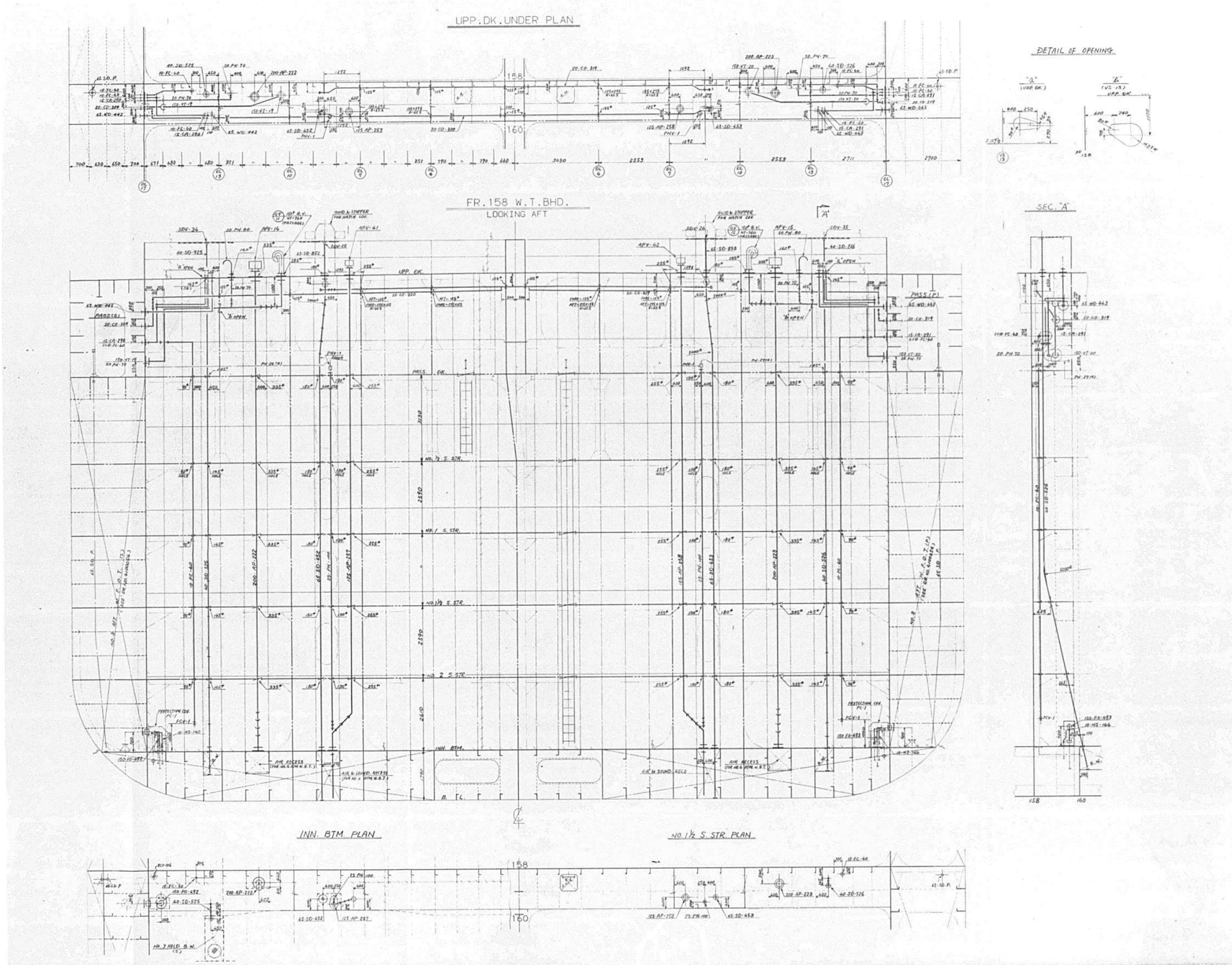
SHIP'S NAME: TILLIE LYKES

隔壁諸管配置(FR.122)
PIPING ARRANGEMENT ON BHD. (34)

SCALE: 1/50 — LYKES REF. NO. 480008 — MITSUI DRAWING NO. 4100030

2/2

1535



PLAN RECORD			
ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN, MADE APPLICABLE TO S1324 AND S1325.	JULY 2' 86

GENERAL NOTE

1. REFERENCE DWG.
   1) PIPING ARR. IN DOUBLE BTM TK INCLUDING DUCT KEEL (DWG NO. 4100058, 61)
   2) PIPING ARR. IN NO.3 FORE AND NO.3 AFT WING F.O.TK. (DWG NO. 4100054)
   3) PIPING ARR. UNDER UPPER DECK PASSAGE (DWG NO. 4100005)
   4) PIPING ARR. ON UPPER DECK (DWG NO. 4100001)
2. BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.

APPROVAL OF OWNER & REGULATORY BODIES

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

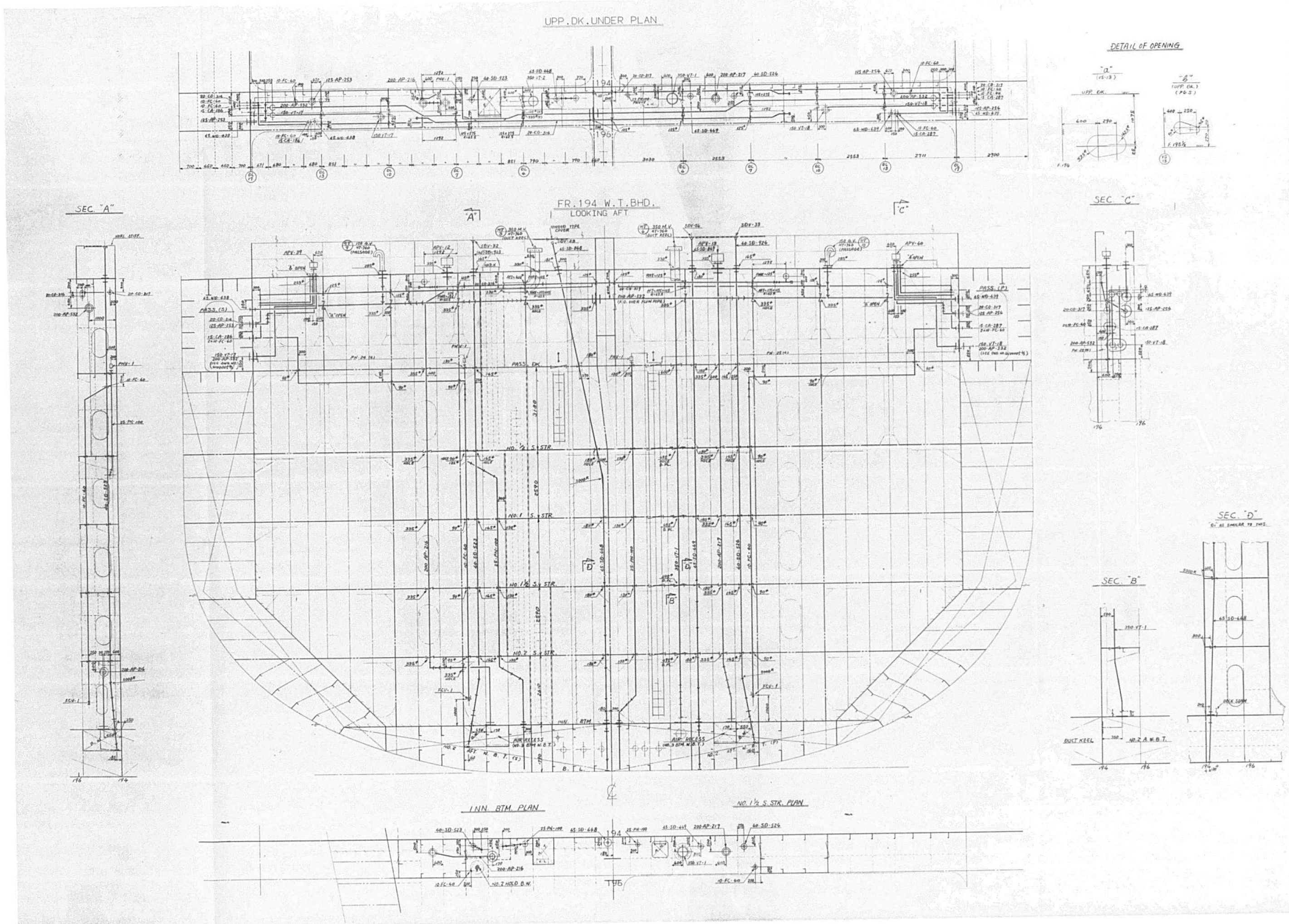
MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP'S NAME: TILLIE LYKES

隔壁諸管配置 (FR.158)
PIPING ARRANGEMENT ON BHD (4/7)

SCALE: 1/50 | LYKES REF. NO.: 480008 | MITSUI DRAWING NO.: 4100030

1536



PLAN RECORD			
ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN MADE APPLICABLE TO S1324 AND S1325.	JULY 2 '86

GENERAL NOTE

1. REFERENCE DWG.
   1) PIPING ARR. IN DOUBLE BTM. TK. INCLUDING DUCT KEEL (DWG. NO. 4100050, 51)
   2) PIPING ARR. UNDER UPPER DECK PASSAGE (DWG. NO. 4100005)
   3) PIPING ARR. ON UPPER DECK (DWG. NO. 4100001)
2. BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.
3. THE HEIGHT OF SOUNDING PIPE SHALL BE, IN GENERAL, RAISED UP TO LEVEL OF HATCH COAMING TOP. (REFER JANUARY MEETING "HULL OUTFITTING" PAGE 222) BUT THE SOUNDING PIPE (SDV-32) FOR NO. 2 HOLD BILGE WELL (STARBOARD SIDE) SHALL BE TERMINATED AT THE DECK LEVEL TO KEEP THE ACCESS SPACE FOR ESCAPE HATCH.

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 28 '85	OFTG/MES-457	AUG 22 '85	T-8-2		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

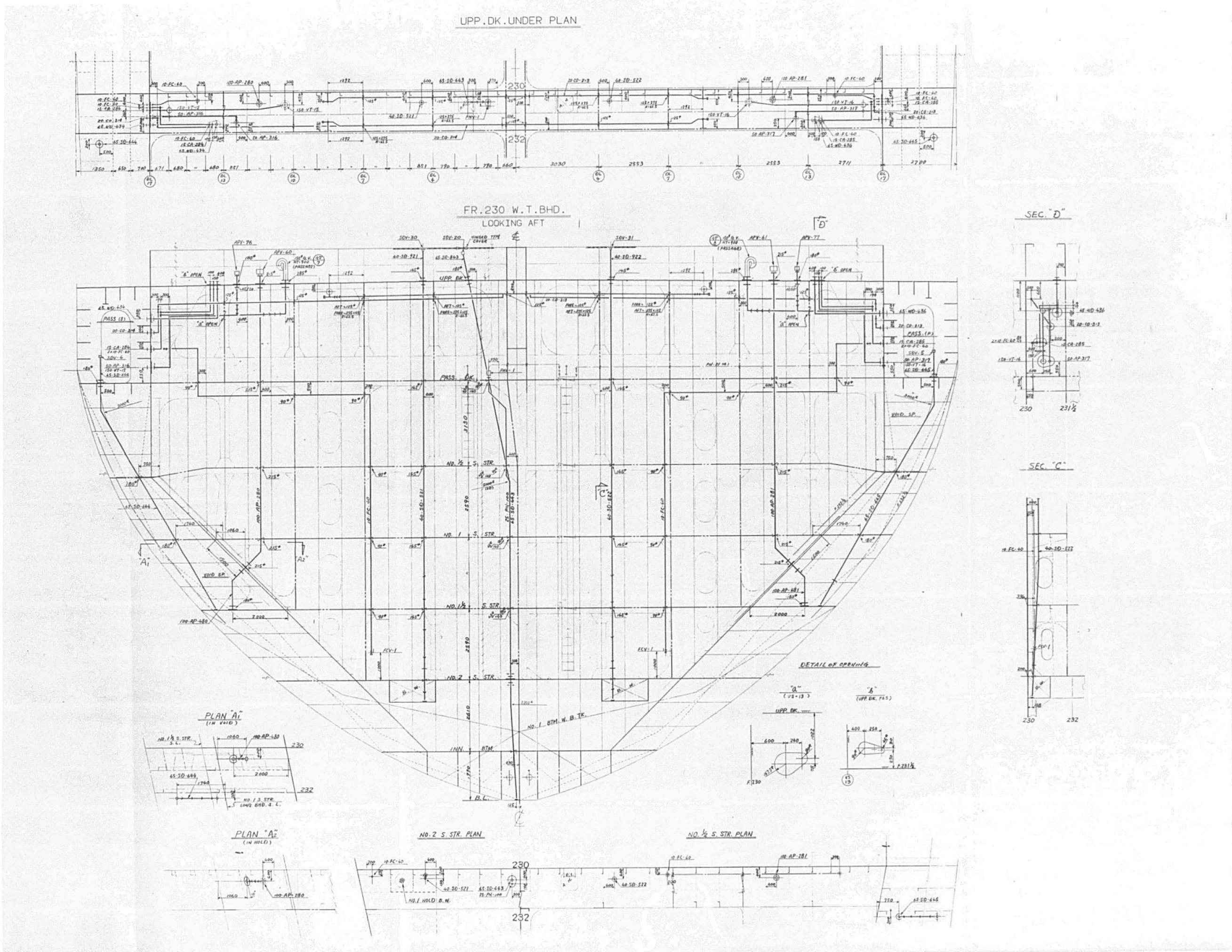
MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NAME: **TILLIE LYKES**

隔壁諸管配置 (FR.194)
PIPING ARRANGEMENT ON BHD. 5/7

SCALE: 1/50 — LYKES REF. NO.: 480008 — MITSUI DRAWING NO.: 4100030

1537



PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN MADE APPLICABLE TO S1324 AND S1325.	

GENERAL NOTE

APPROVAL OF OWNER & REGULATORY BODIES

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

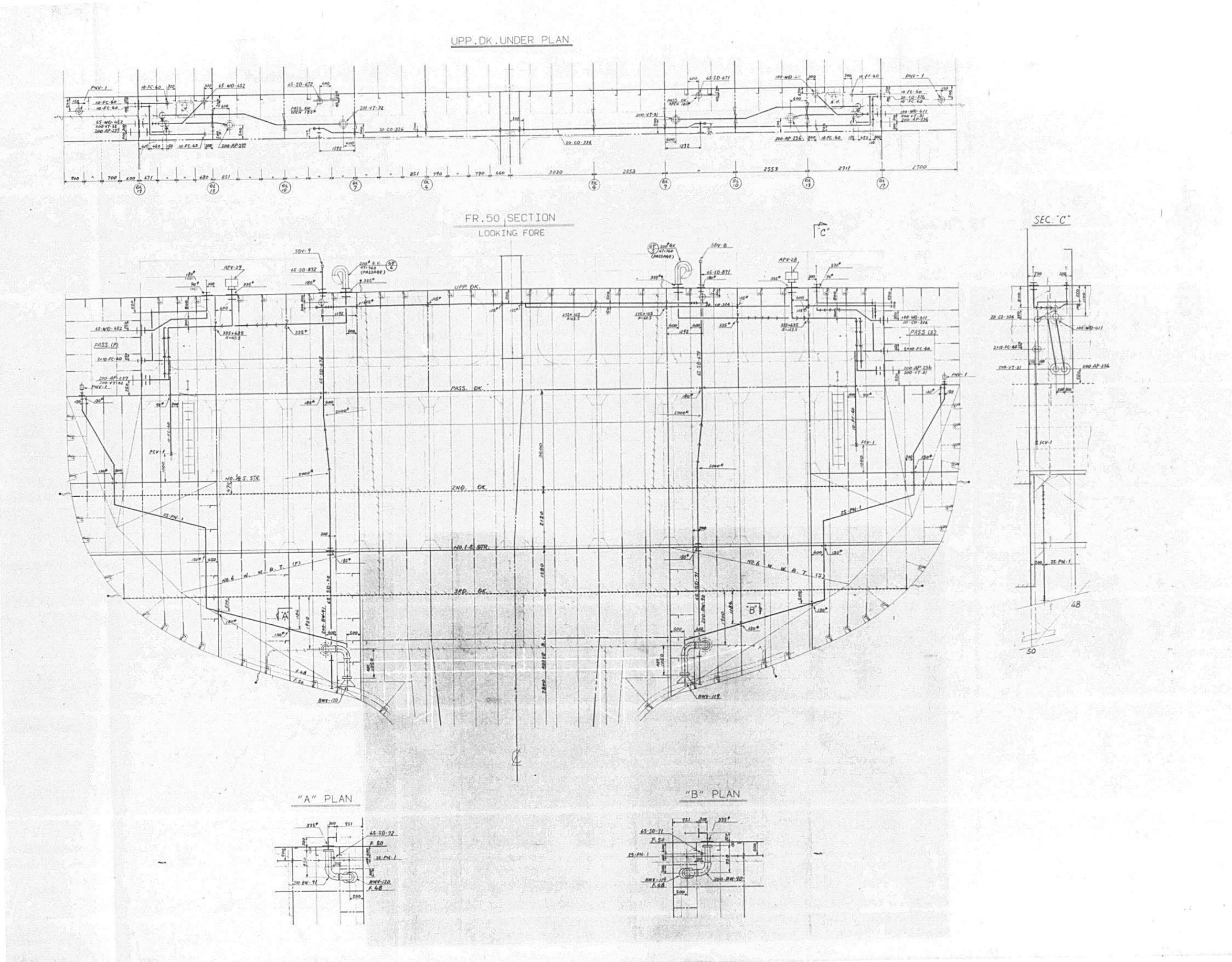
MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP'S NAME: TILLIE LYKES

隔壁諸管配置(FR 230)
PIPING ARRANGEMENT ON BHD.

SCALE: 1/50
LYKES REF. NO.: 480008
MITSUI DRAWING NO.: 4100030

1538



PLAN RECORD			
ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN, MADE APPLICABLE TO S1324 AND S1325.	JULY 2 '86

GENERAL NOTE	
1	REFERENCE DWG.
	1) PIPING ARR. IN NO.6 HOLD. (INCL. PASS. AND VOID SP.) (DWG. NO. 4100039)
	2) PIPING ARR. ON UPPER DECK. (DWG. NO. 4100001)
2	BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		ABS			
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 28 '85	OTTS/MEG-437	AUG 22 '85	T-8-2		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

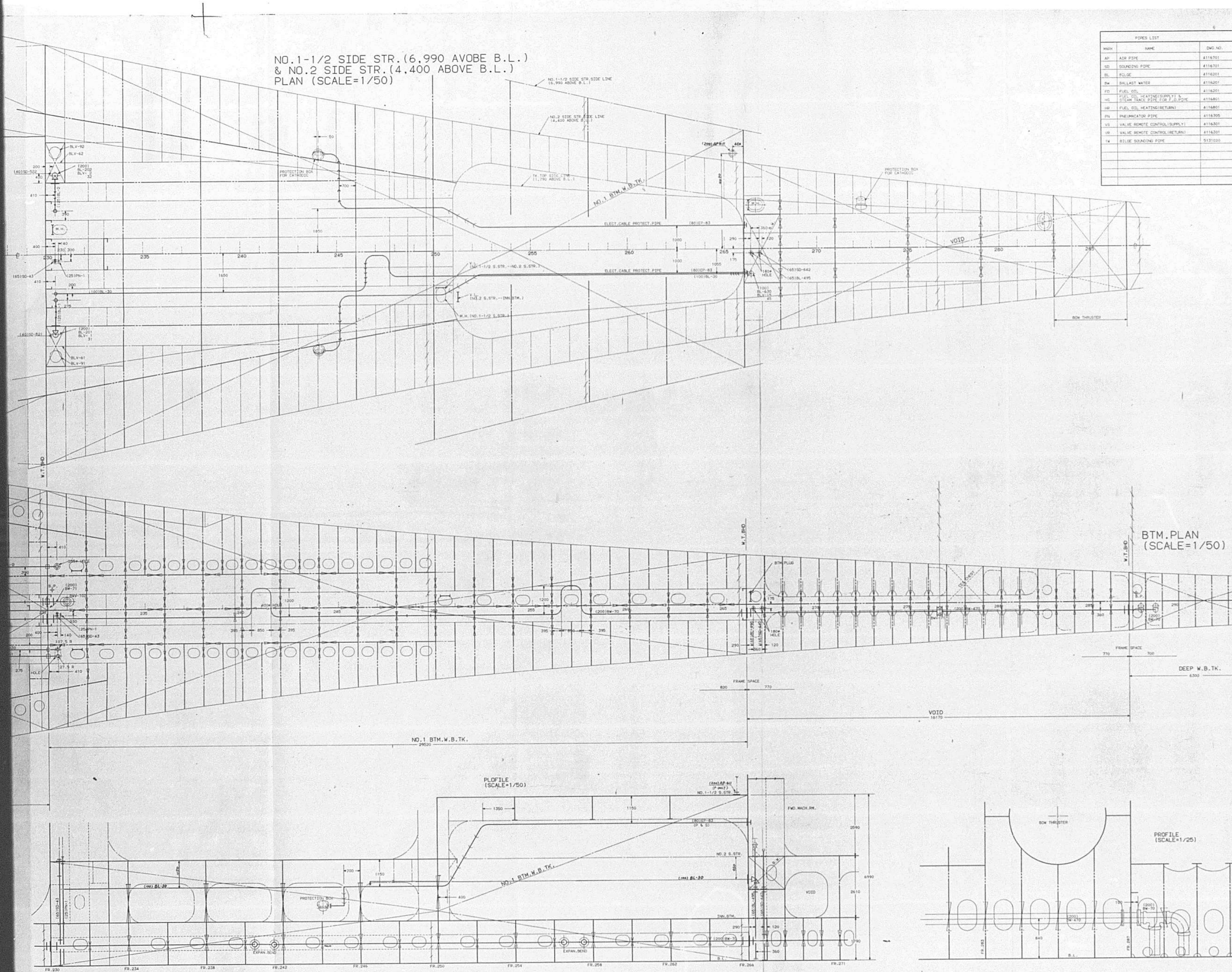
OUTFIT. DESIGN SEC. (PIPING) SEC. CHIEF

隔壁諸管配置 (FR.50)
PIPING ARRANGEMENT ON BHD. (1/1)

DATE (TEL 2240)

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
	1/50	480008	4100030

1539



PIPES LIST		
MARK	NAME	DWG.NO.
AP	AIR PIPE	4116701
SD	SOUNDING PIPE	4116701
BL	BILGE	4116201
BW	BALLAST WATER	4116201
FO	FUEL OIL	4116201
HS	FUEL OIL HEATING(SUPPLY) & STEAM TRACE PIPE FOR F.O.PIPE	4116801
HR	FUEL OIL HEATING(RETURN)	4116801
PN	PNEUMACATOR PIPE	4116705
VS	VALVE REMOTE CONTROL(SUPPLY)	4116301
VR	VALVE REMOTE CONTROL(RETURN)	4116301
IW	BILGE SOUNDING PIPE	5131020

PLAN RECORD			
ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
ORIG.		PREPARED FOR S1323 AS FINISHED PLAN / MADE APPLICABLE TO S1324 AND S1325	

GENERAL NOTE	
1	BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.
2	REFERENCE DWG.
	1) PIPING ARR.IN DOUBLE BTM.TK.INCLUDING DUCT KEEL(SECTION) (DWG.NO.4100051)
	2) PIPING ARR.ON BHD. (DWG.NO.4100030)
	3) PIPING ARR.IN NO.3 FORE AND NO.3 AFT WING F.O.TK.(DWG.NO.4100054)
	4) DUCT & PIPING ARR.IN FWD.MACH.SPACE (DWG.NO.4A16910)
3	PIPINGS WHICH ARE NOT SHOWN IN THIS DWG.(VOID SPACE BETWEEN FR.266 & FR.287 AND DEEP W.B.TK.) ARE SHOWN BY OTHER DWGS.

APPROVAL OF OWNER & REGULATORY BODIES						
ALT. NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL						

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP'S NAME: TILLIE LYKES

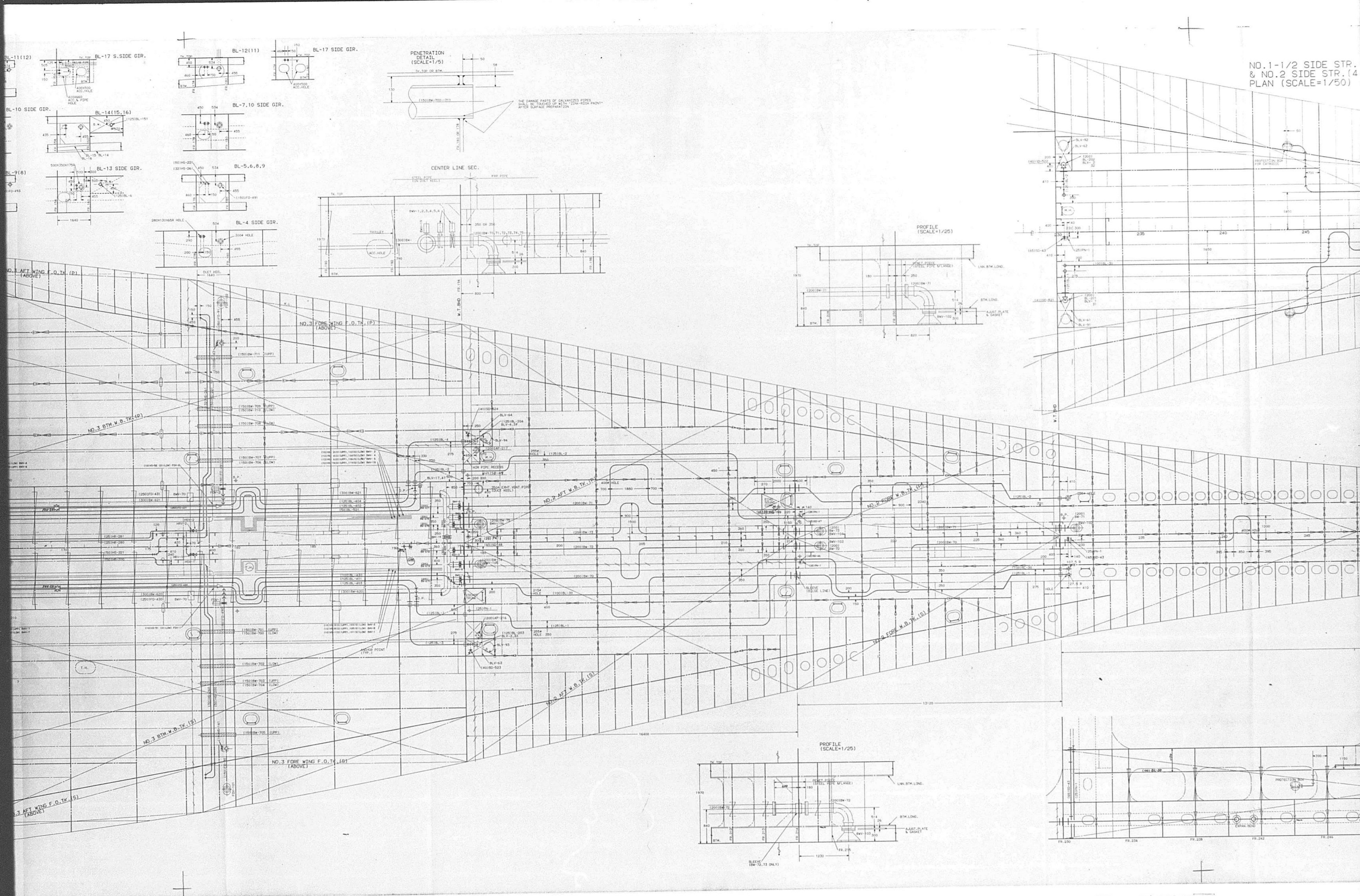
二重底内諸管配置（平面）

PIPING ARRANGEMENT IN DOUBLE BOTTOM TK.INCLUDING DUCT KEEL(PLAN)

JOB NO. TS1323/24/25 | SCALE 1/50, 1/25 | LYKES REF. NO. 480009 | MITSUI DRAWING NO. 4100050

1/4

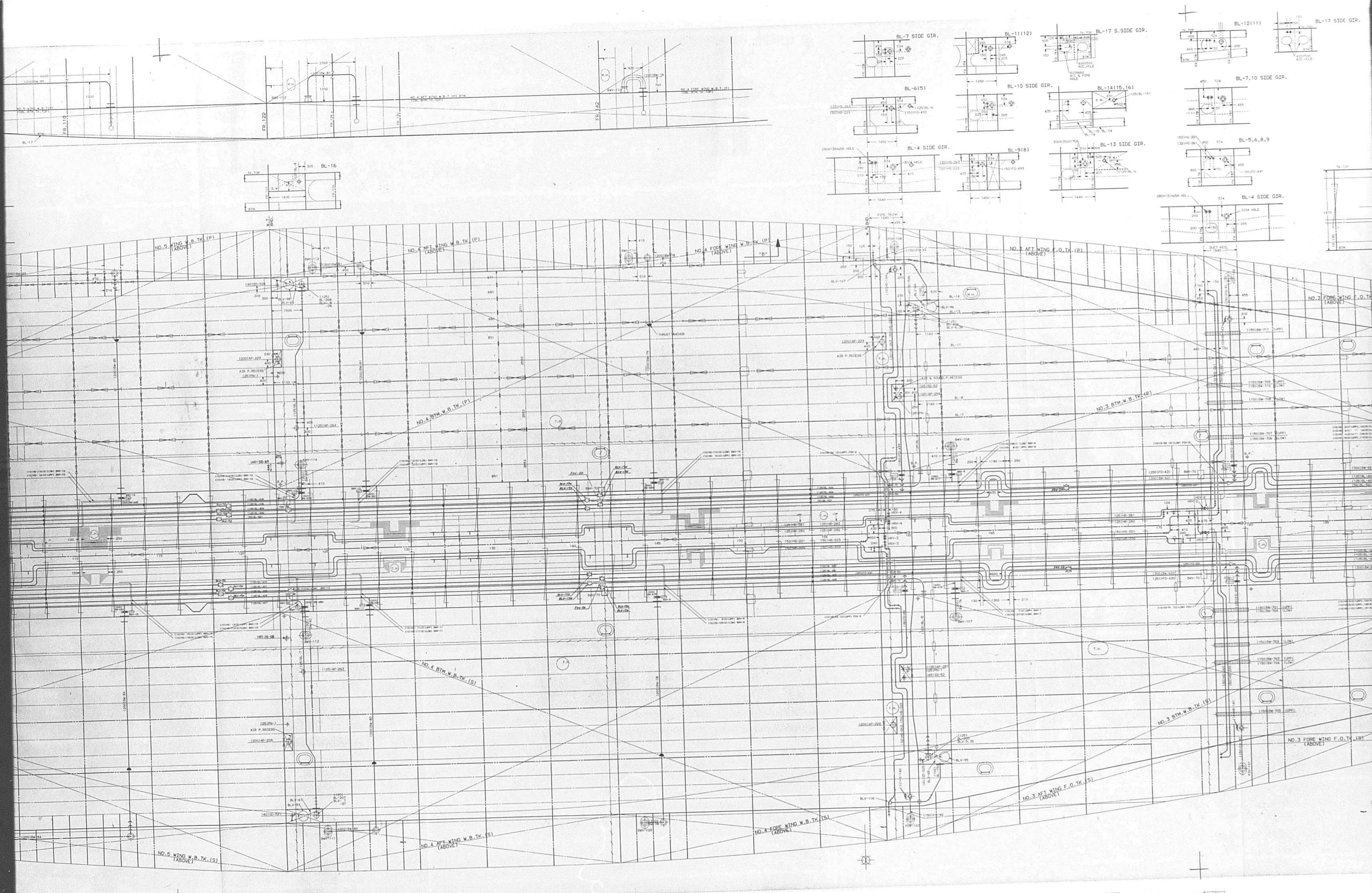
1540



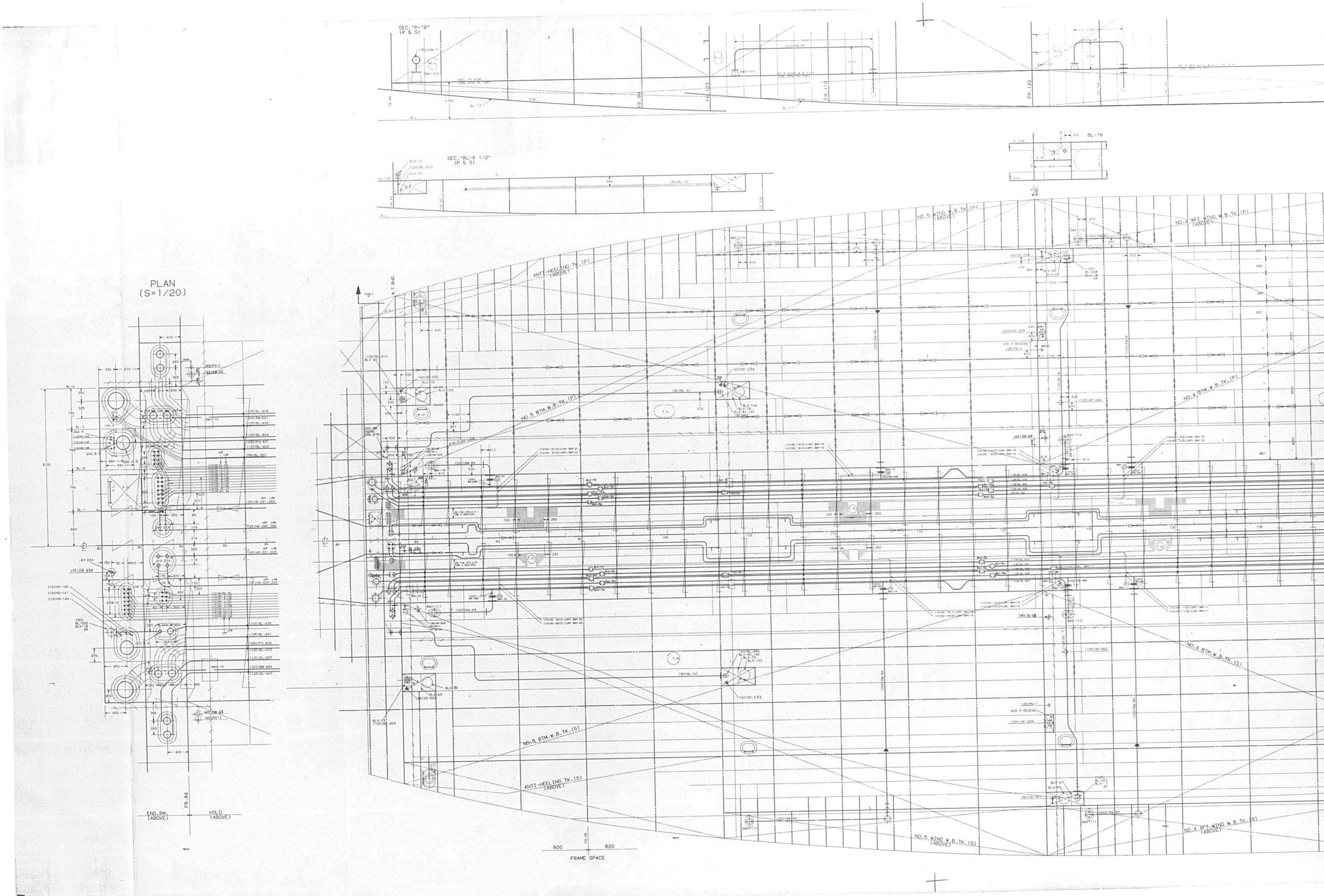
BL-17 S.SIDE GIR.
BL-12(11)
BL-17 SIDE GIR.
PENETRATION DETAIL (SCALE=1/5)
BL-10 SIDE GIR.
BL-14(15,16)
BL-7,10 SIDE GIR.
BL-13 SIDE GIR.
BL-5,6,8,9
BL-4 SIDE GIR.
CENTER LINE SEC.
PROFILE (SCALE=1/25)
NO.3 FORE WING F.O.TK.(P) (ABOVE)
NO.3 BTM.W.B.TK.(P)
NO.3 BTM.W.B.TK.(S)
NO.3 FORE WING F.O.TK.(S) (ABOVE)
PLAN (SCALE=1/50)

2/4

1541

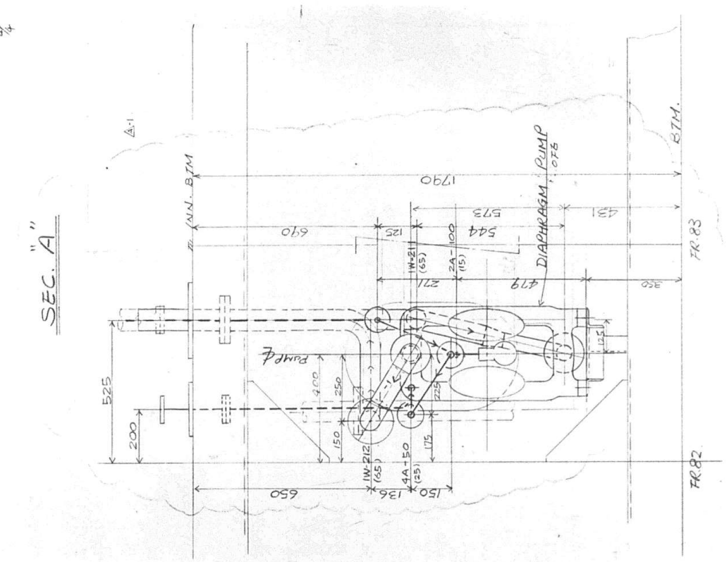

BL-7 SIDE GIR.
BL-11(12)
BL-17 S.SIDE GIR.
BL-12(11)
BL-17 SIDE GIR.
BL-6(5)
BL-10 SIDE GIR.
BL-14(15,16)
BL-7,10 SIDE GIR.
BL-4 SIDE GIR.
BL-9(8)
BL-13 SIDE GIR.
BL-5,6,8,9
BL-16
FR.122
NO.5 WING W.B.TK.(P) (ABOVE)
NO.4 AFT WING W.B.TK.(P) (ABOVE)
NO.4 FORE WING W.B.TK.(P) (ABOVE)
NO.3 AFT WING F.O.TK.(P) (ABOVE)
NO.3 FORE WING F.O.TK.(P) (ABOVE)
THRUST ANCHOR
AIR P.RECESS
NO.4 BTM.W.B.TK.(P)
NO.3 BTM.W.B.TK.(P)
NO.4 BTM.W.B.TK.(S)
NO.3 BTM.W.B.TK.(S)
NO.3 FORE WING F.O.TK.(S) (ABOVE)
NO.3 AFT WING F.O.TK.(S) (ABOVE)
NO.4 FORE WING W.B.TK.(S) (ABOVE)
NO.4 AFT WING W.B.TK.(S) (ABOVE)
NO.5 WING W.B.TK.(S) (ABOVE)

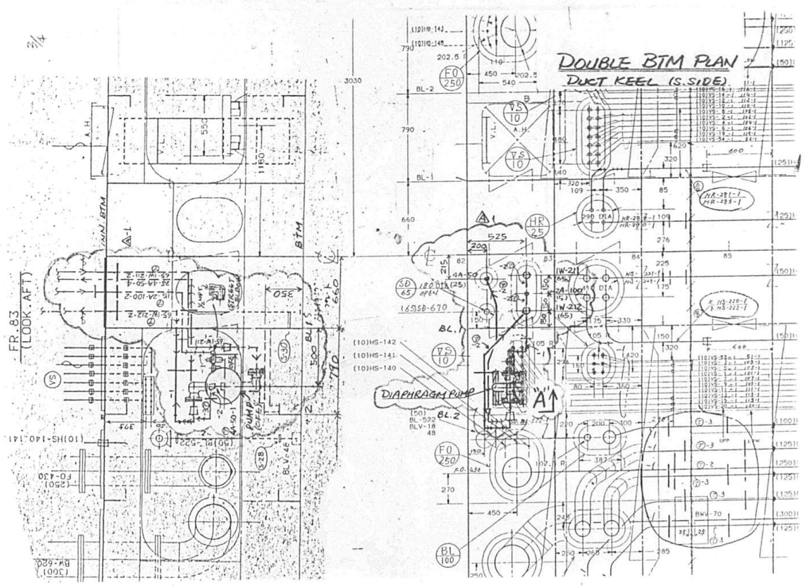
3/4 1542



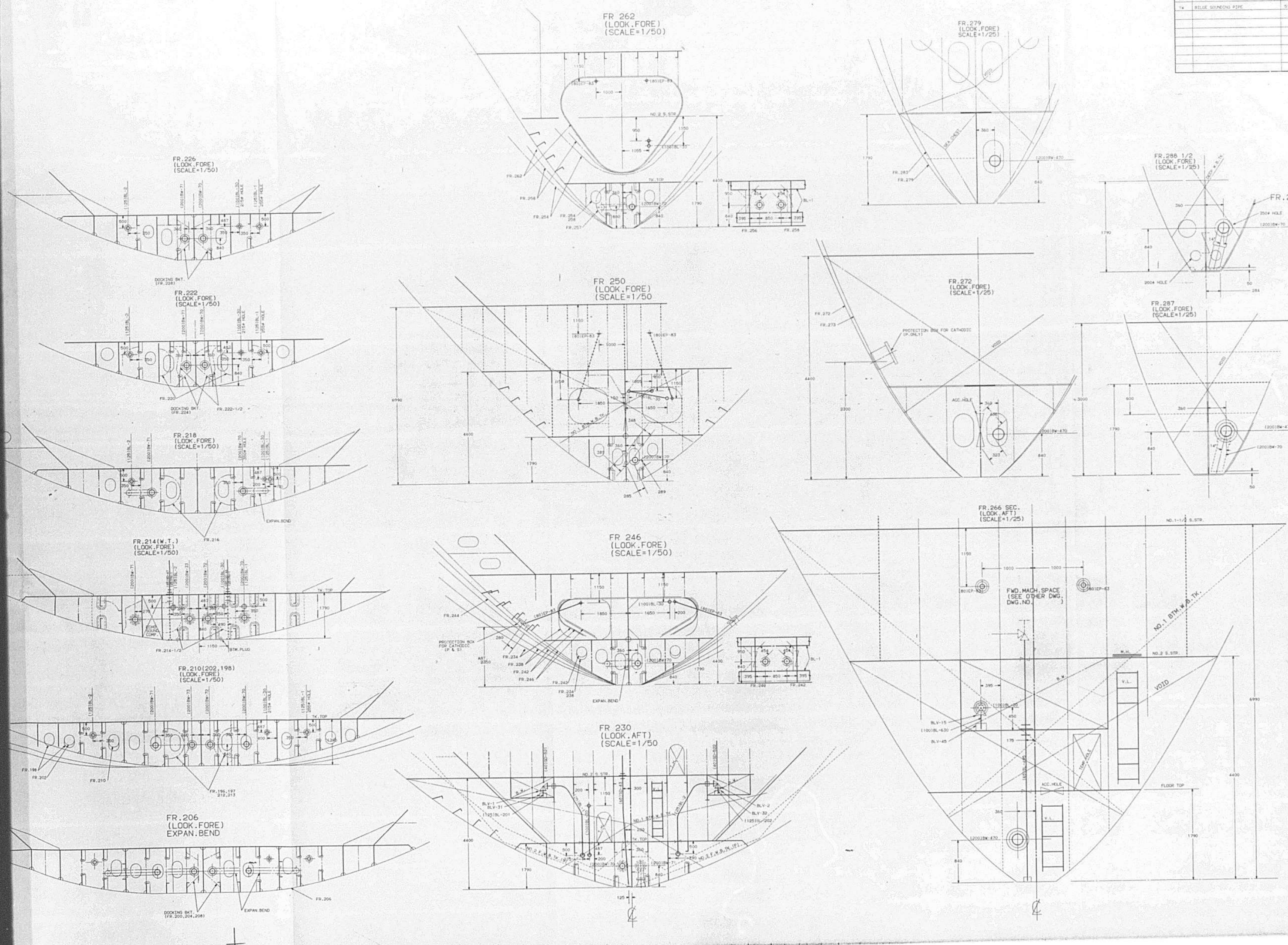
SEC."B-B" (P & S)
SEC."BL-8 1/2" (P & S)
BL-16
PLAN (S=1/20)
NO.5 WING W.B.TK.(P) (ABOVE)
NO.4 AFT WING W.B.TK.(P) (ABOVE)
ANTI-HEELING TK.(P) (ABOVE)
NO.5 BTM.W.B.TK.(P)
NO.4 BTM.W.B.TK.(P)
NO.4 BTM.W.B.TK.(S)
NO.5 BTM.W.B.TK.(S)
ANTI-HEELING TK.(S) (ABOVE)
NO.5 WING W.B.TK.(S) (ABOVE)
NO.4 AFT WING W.B.TK.(S) (ABOVE)
ENG.RM (ABOVE)
HOLD (ABOVE)
FR.84
800
820
FRAME SPACE

4/4 1543


SEC. "A"
DIAPHRAGM PUMP
FR.83
FR.82
BTM.
1290


DOUBLE BTM PLAN
DUCT KEEL (S.SIDE)
DIAPHRAGM PUMP
FR.83 (LOOK.AFT)

1544



PIPES LIST		
MARK	NAME	DWG.NO.
AP	AIR PIPE	4116701
SD	SOUNDING PIPE	4116701
BL	BILGE	4116201
BW	BALLAST WATER	4116201
FO	FUEL OIL	4116201
HS	FUEL OIL HEATING(SUPPLY) & STEAM TRACE PIPE FOR F.O.PIPE	4116801
HR	FUEL OIL HEATING(RETURN)	4116801
PN	PNEUMACATOR PIPE	4116705
VS	VALVE REMOTE CONTROL(SUPPLY)	4116301
VR	VALVE REMOTE CONTROL(RETURN)	4116301
TW	BILGE SOUNDING PIPE	5131020

PLAN RECORD			
ALT.NO	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN MADE APPLICABLE TO S1324 AND S1325.	JULY 2 '86

GENERAL NOTE	
1	BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.
2	REFERENCE DWG.
	1) PIPING ARR.IN DOUBLE BTM.TK.INCLUDING DUCT KEEL(PLAN) (DWG.NO.4100050)
	2) PIPING ARR.ON BHD. (DWG.NO.4100030)
	3) PIPING ARR.IN NO.3 FORE AND NO.3 AFT F.O.TK.(DWG.NO.4100054)
	4) DUCT & PIPING ARR.IN FWD.MACH.SPACE (DWG.NO.4A169910)
3	PIPINGS WHICH ARE NOT SHOWN IN THIS DWG.(VOID SPACE BETWEEN FR.266 & FR.287 AND DEEP W.B.TK.) ARE SHOWN BY OTHER DWGS.

APPROVAL OF OWNER & REGULATORY BODIES

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT

SHIP'S NAME: TILLIE LYKES

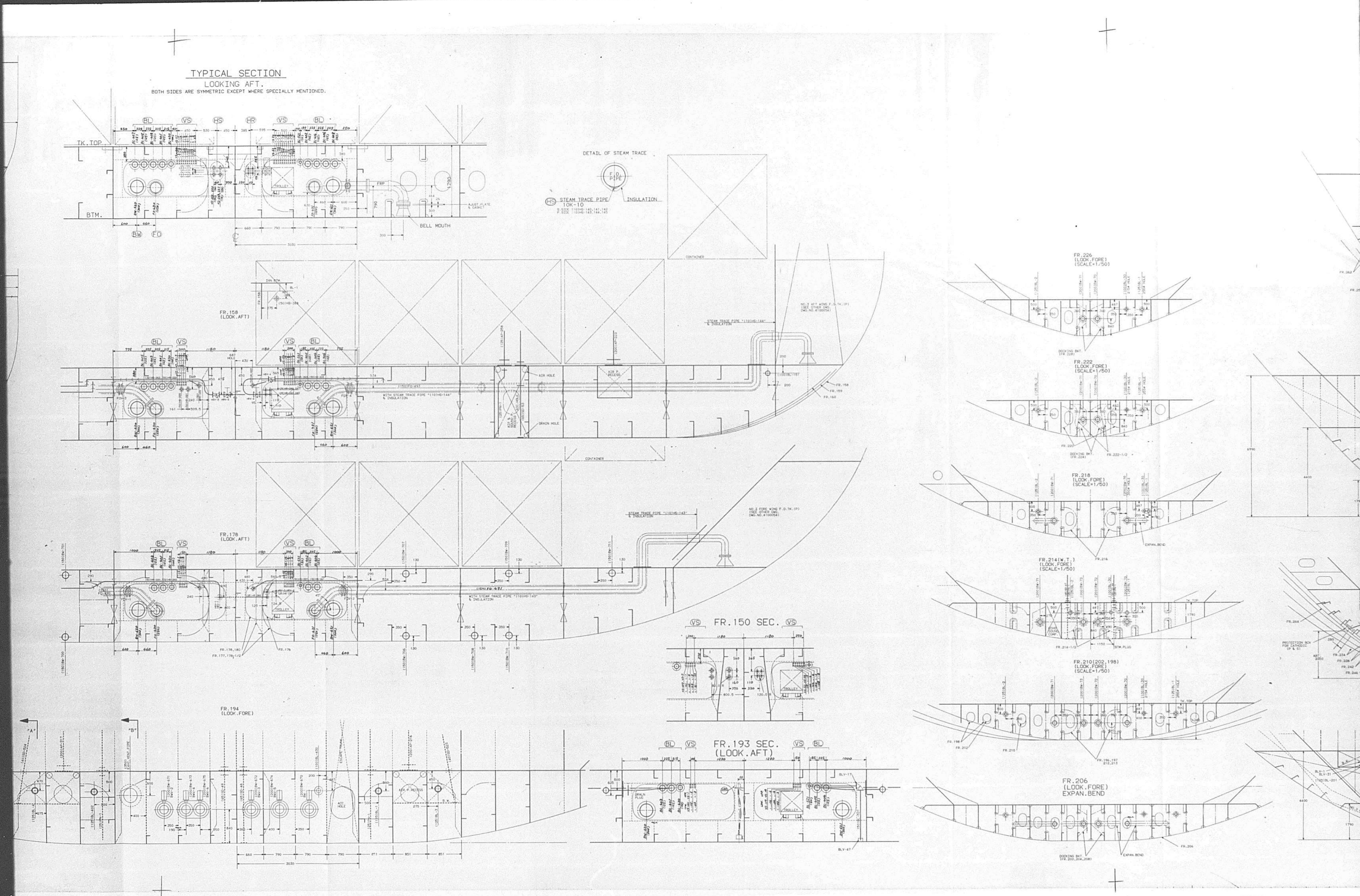
OUTFIT. DESIGN SEC.(PIPING)

二重底内諸管配置（断面）

PIPING ARRANGEMENT IN DOUBLE BOTTOM TK.INCLUDING DUCT KEEL(SECTION)

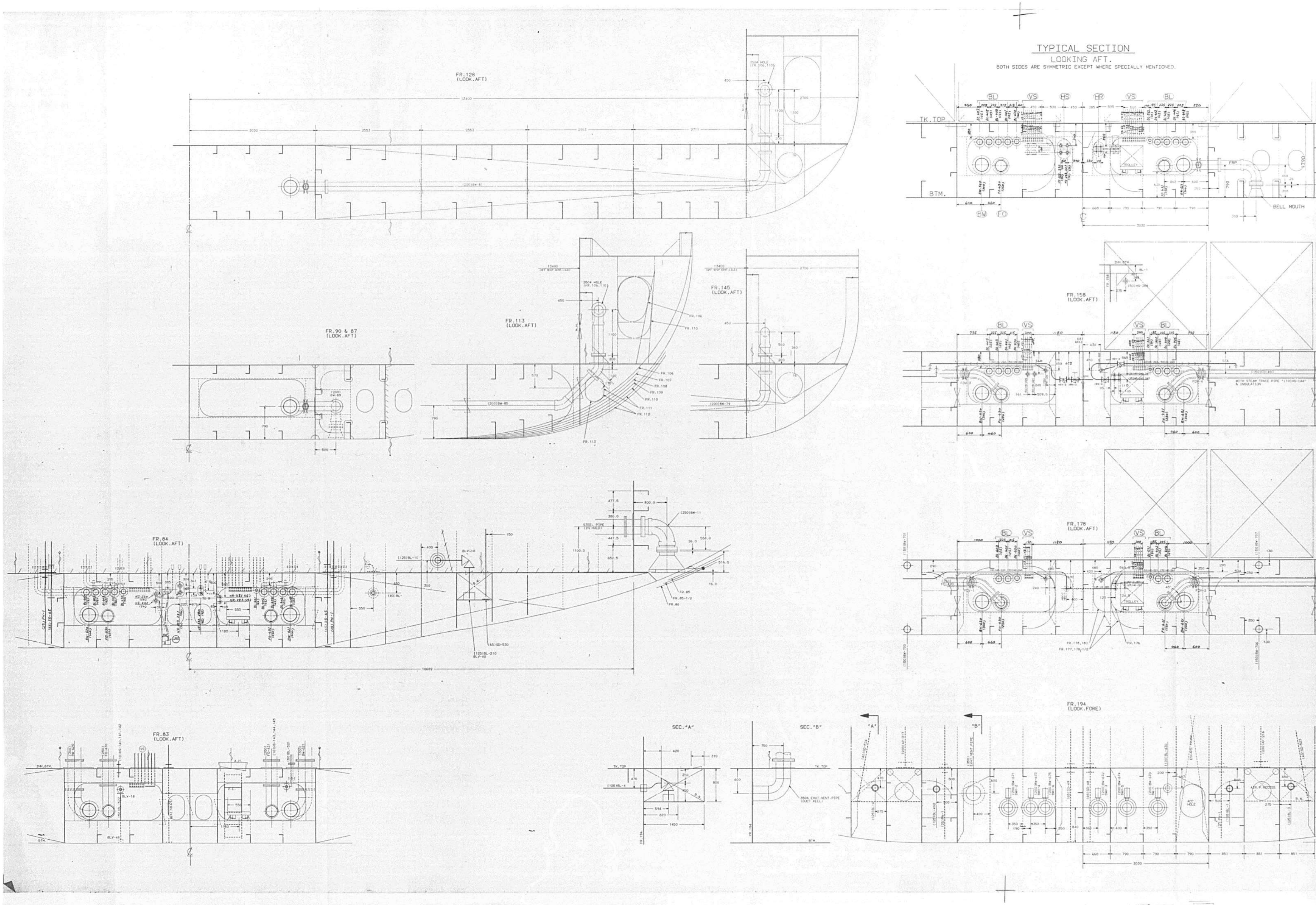
JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25	1/50 1/25	480010	4100051

1/3 1545


TYPICAL SECTION
LOOKING AFT.
BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.
TK.TOP
BTM.
BELL MOUTH
DETAIL OF STEAM TRACE
STEAM TRACE PIPE
INSULATION
CONTAINER
FR.158
(LOOK.AFT)
AIR HOLE
DRAIN HOLE
FR.178
(LOOK.AFT)
FR.150 SEC.
FR.193 SEC.
(LOOK.AFT)
FR.194
(LOOK.FORE)
FR.226
(LOOK.FORE)
(SCALE=1/50)
FR.222
(LOOK.FORE)
(SCALE=1/50)
FR.218
(LOOK.FORE)
(SCALE=1/50)
FR.214(W.T.)
(LOOK.FORE)
(SCALE=1/50)
FR.210(202,198)
(LOOK.FORE)
(SCALE=1/50)
FR.206
(LOOK.FORE)
EXPAN.BEND

2/3

1546


TYPICAL SECTION
LOOKING AFT.
BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.
TK.TOP
BTM.
BELL MOUTH
FR.128
(LOOK.AFT)
FR.90 & 87
(LOOK.AFT)
FR.113
(LOOK.AFT)
FR.145
(LOOK.AFT)
FR.158
(LOOK.AFT)
FR.84
(LOOK.AFT)
FR.178
(LOOK.AFT)
FR.83
(LOOK.AFT)
SEC."A"
SEC."B"
FR.194
(LOOK.FORE)

3/3 1547

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL								

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO. 1323	DOCTOR LYKES	NO. 1158	JAMES LYKES
NO. 1324	ALMERIA LYKES	NO. 1159	JOSEPH LYKES
NO. 1325	TILLIE LYKES	NO. 1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER | SHIP'S NO. ——— | SHIP'S NAME **TILLIE LYKES**

OUTFIT. DESIGN SEC. (PIPING)
SEC. CHIEF
ASST.
CHARGE
STAFF
DATE (TEL 2240)

二重底内諸管配置（断面）
PIPING ARRANGEMENT IN DOUBLE BOTTOM TK. INCLUDING DUCT KEEL (SECTION)

JOB NO. TS1323/24/25 JOBCLASSIF. NO.	SCALE 1/25	LYKES REF. NO. 480010	MITSUI DRAWING NO. 4100051

(5 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
ORIG.		SUBMITTED FOR OWNER'S STUDY	13 OCT. '84 J. F.
ORIG.		SUBMITTED FOR ABS (NEW ORLEANS) AND OWNER'S APPROVAL	10 DEC. '84 J. F.

DWG. NO. 4100051 2/5

GENERAL NOTE

DWG. NO. 4100051 3/5

PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105

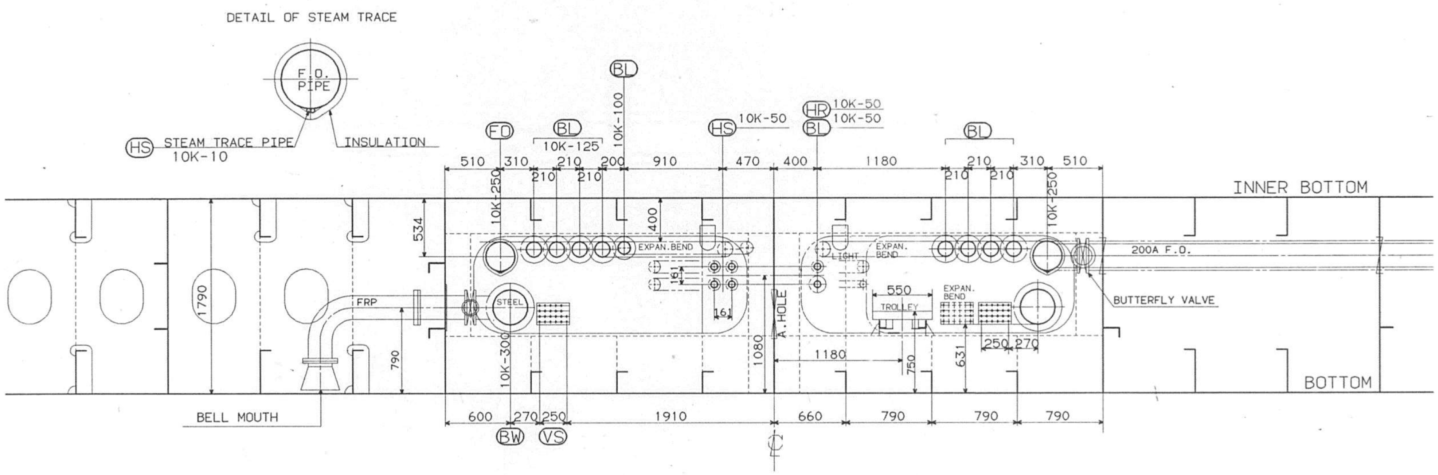
4100051 4/5

1548

TYPICAL SECTION

LOOKING AFT.

BOTH SIDES ARE SYMMETRIC EXCEPT WHERE SPECIALLY MENTIONED.



DWG.NO.4100051 5/5

1549

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	JAN. 25 '86	LBFTS/MES-618				NOT REQUIRED		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER

SHIP'S NAME: TILLIE LYKES

OUTFIT. DESIGN SEC.(PIPING)

船首楼甲板諸管配置
(含 ボースンストアー及 前部油圧ポンプ室)

PIPING ARR. ON FOCSLE DECK
(INCL. BOATSW STORE AND FWD. PUMP UNIT SPACE)

DATE (TEL 2240)

JOB NO. TS1323/24/25 | SCALE 1/50 | LYKES REF. NO. 480011 | MITSUI DRAWING NO. 4100010

(9 SHEETS WITH COVER)

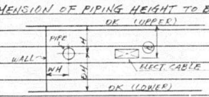
PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JULY. 2 '86

DWG.NO. 4100010 2/9

GENERAL NOTE

1 DIMENSION OF PIPING HEIGHT TO BE SHOWN AS FOLLOWING FIGURE



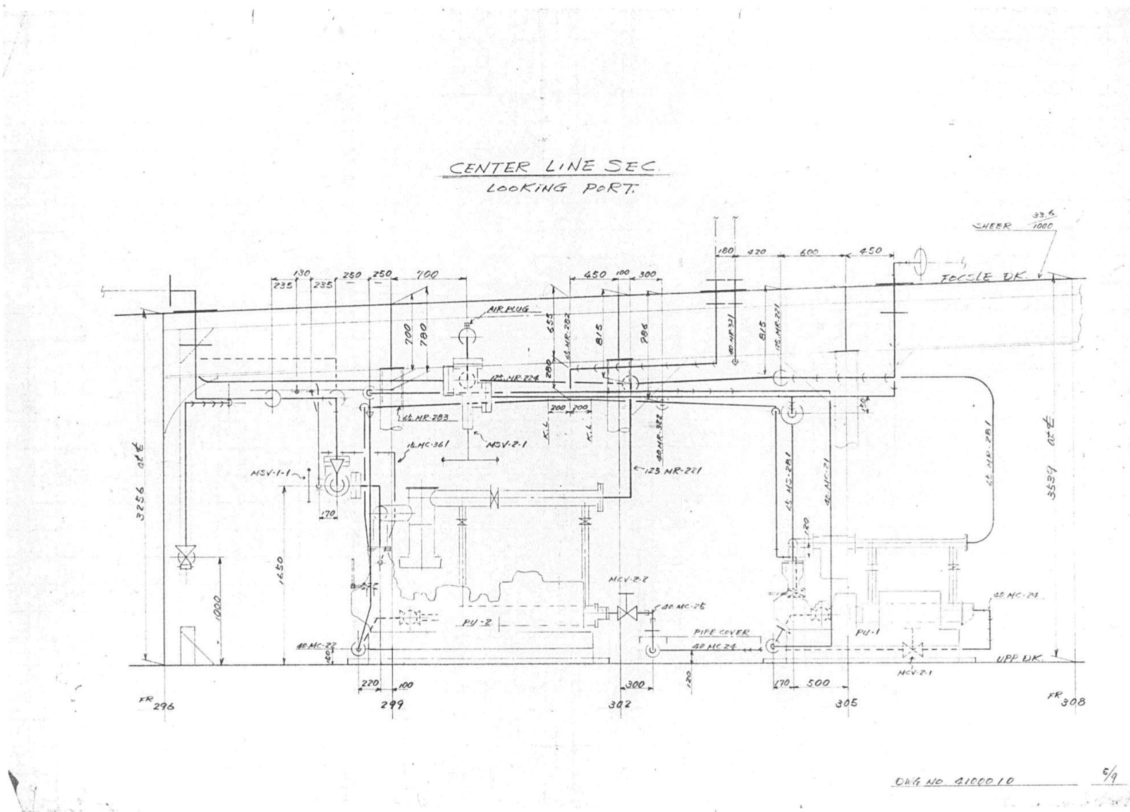
DWG.NO. 4100010 3/9

PIPE LIST

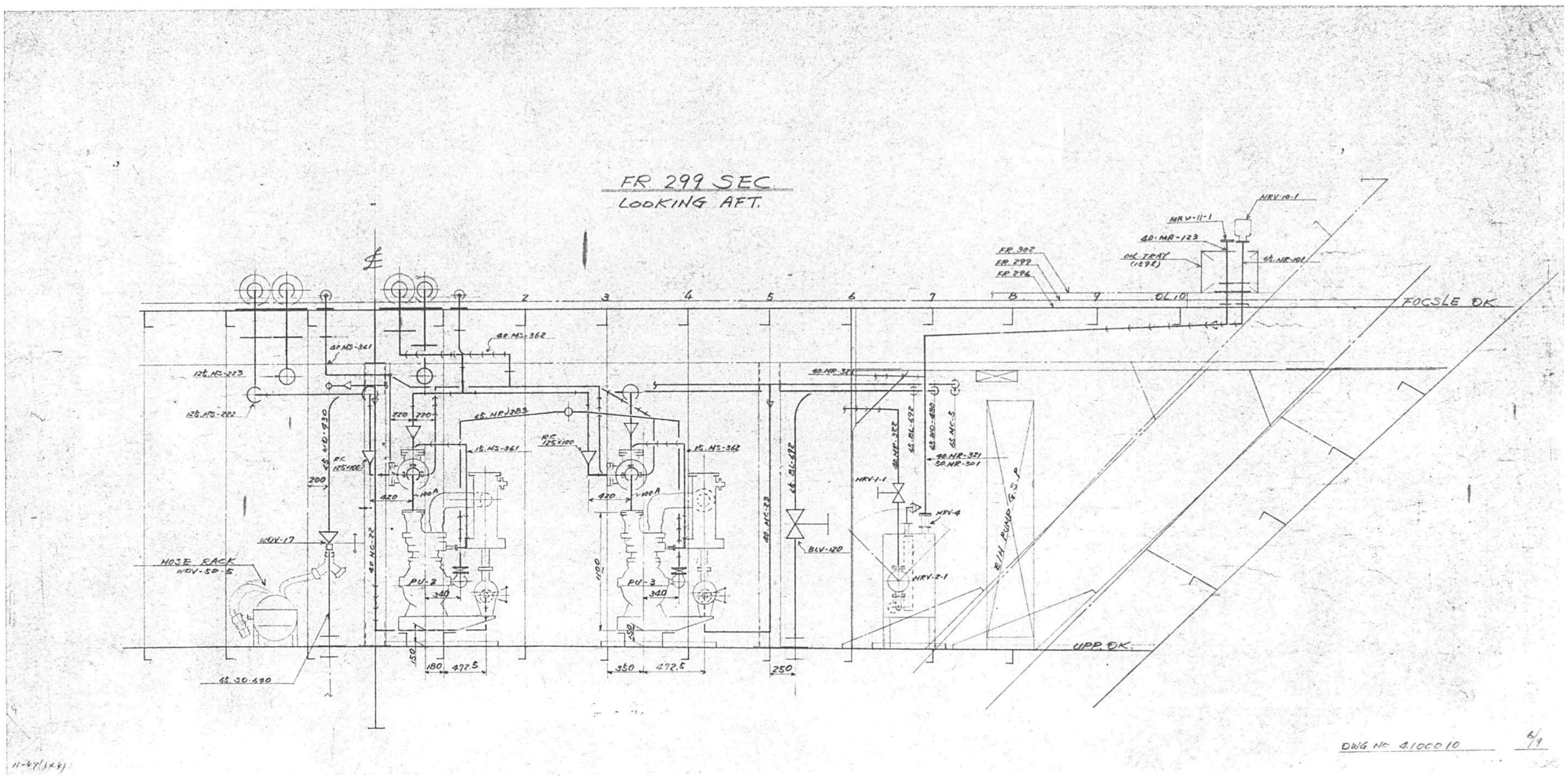
MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

DWG.NO. 4100010 4/9

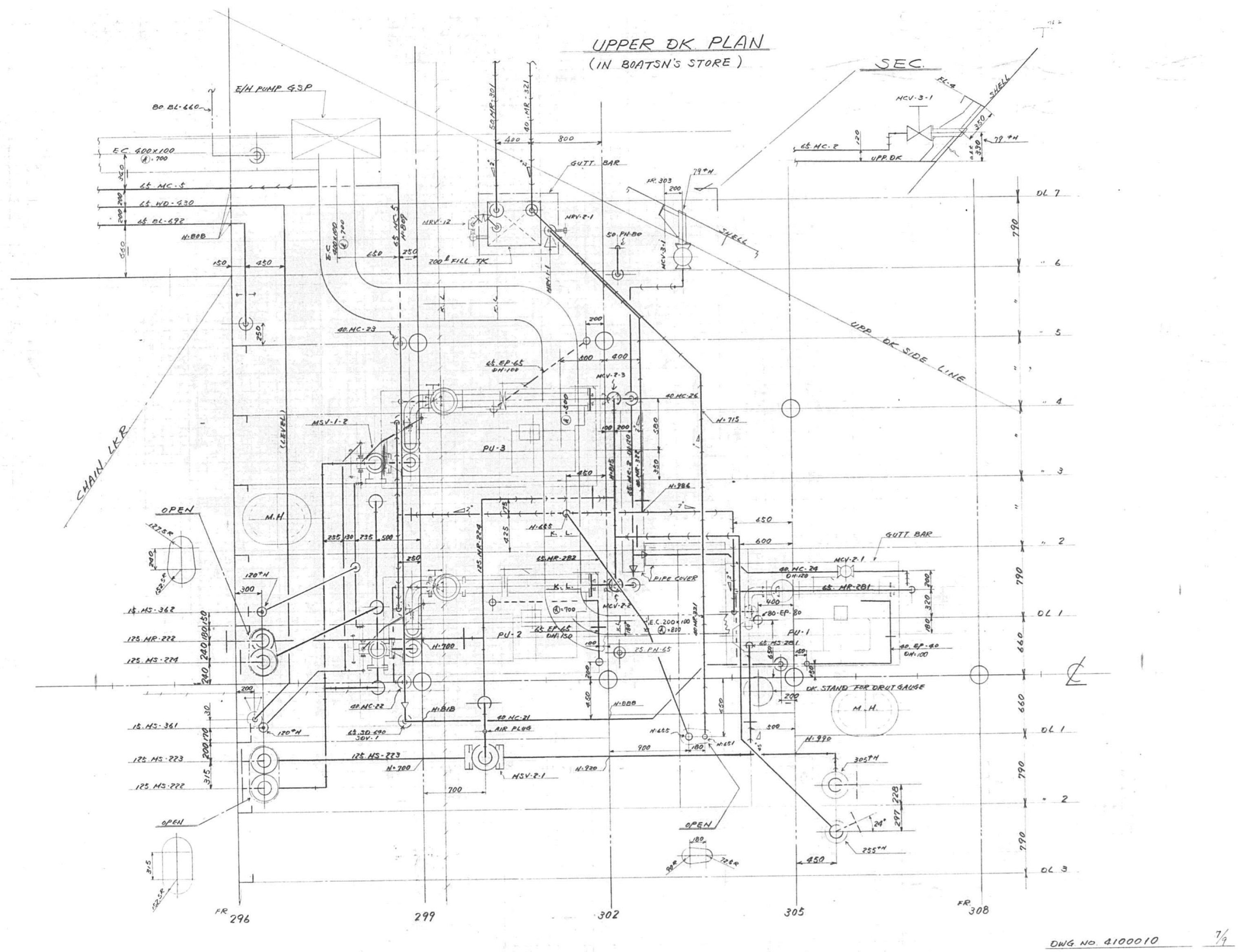
1550


CENTER LINE SEC.
LOOKING PORT.
FOCSLE DK
UPP DK
SHEER
AIR PLUG
MSV-2-1
MSV-1-1
MCV-2-2
MCV-2-1
PU-2
PU-1
PIPE COVER
FR 296
299
302
305
FR 308
3256
3584
DWG NO 410001 0
6/9

1551

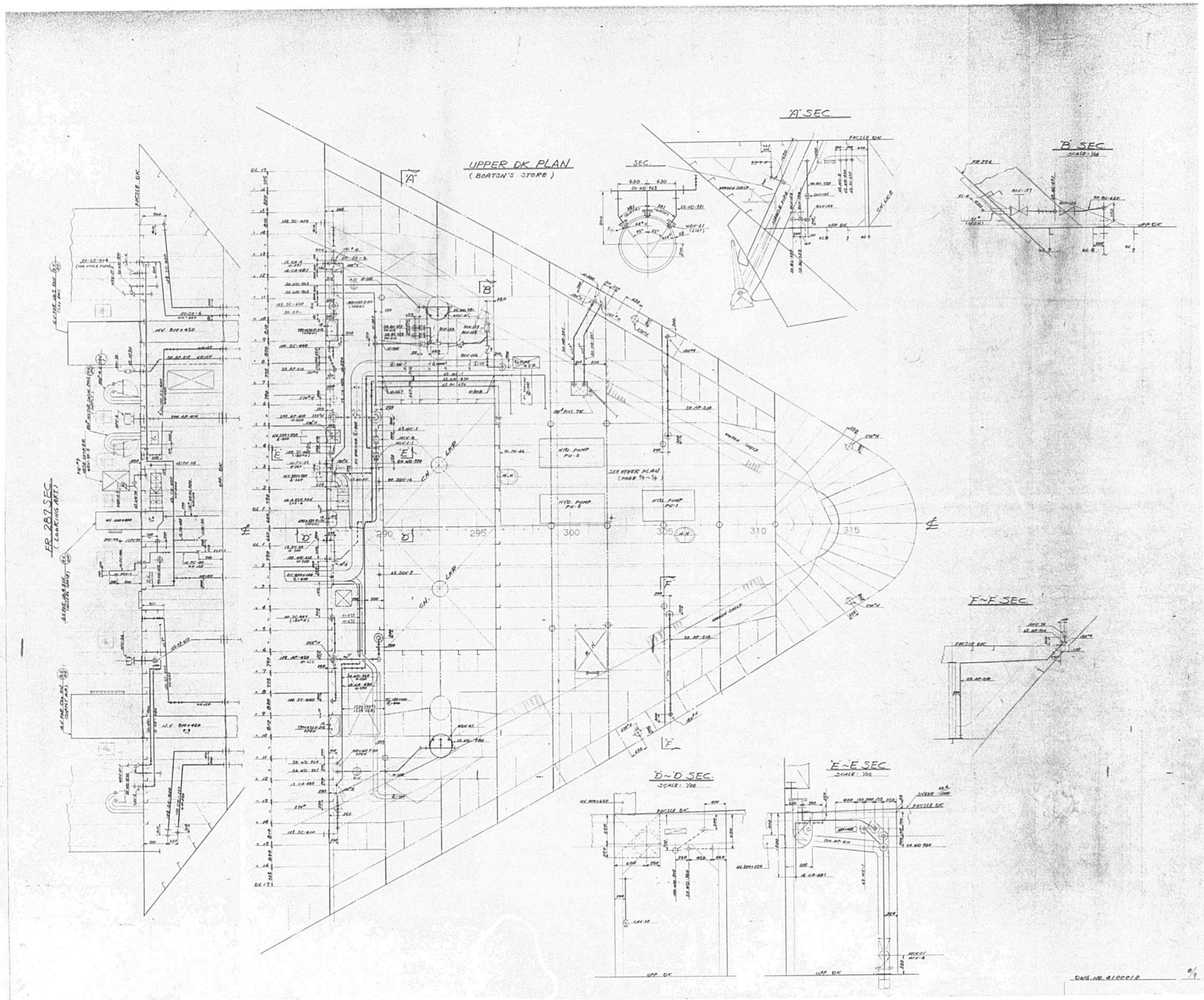

FR 299 SEC
LOOKING AFT.
FOCSLE DK
UPP DK
HOSE RACK
PU-2
PU-3
R/H PUMP G.S.P.
DWG No. 4100010

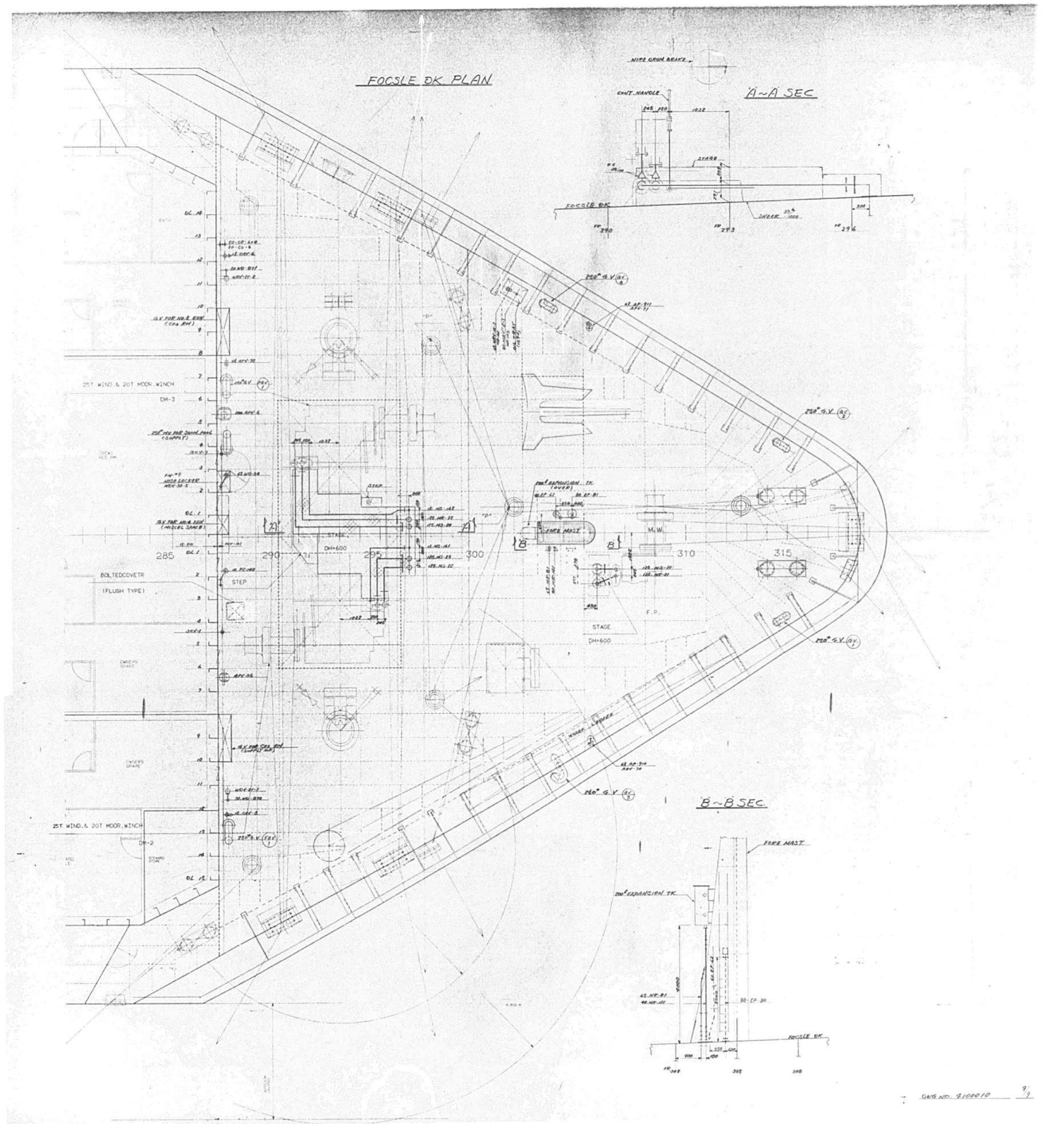
1552



UPPER DK PLAN
(IN BOATSN'S STORE)
SEC.
E/H PUMP GSP
CHAIN LKR
UPP DK SIDE LINE
PU-3
PU-2
PU-1
M.H
OPEN
DK STAND FOR DRUT GAUGE
GUTT BAR
PIPE COVER
AIR PLUG
FR 296
299
302
305
FR 308
DWG NO. 4100010
7/9

1553


UPPER DK PLAN
(BOATSN'S STORE)
'A' SEC
'B' SEC
F~F SEC
D~D SEC
E~E SEC
FR 287 SEC
(LOOKING AFT)
HYD. PUMP
290
295
300
305
310
315



FOCSLE DK. PLAN
A~A SEC
B~B SEC
25T WIND.& 20T MOOR. WINCH
DH-3
BOLTEDCOVETR
(FLUSH TYPE)
STEP
STAGE
DH-600
FORE MAST
M.W.
F.P.
285
290
300
310
315
25T WIND.& 20T MOOR. WINCH
DH-2

1555

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MY.28.'85	OFTS/MES-459						

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD. TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC.(PIPING)

第六艙内諸管配置

PIPING ARRANGEMENT IN NO. 6 HOLD (INCL. PASS. AND VOID SP.)

DATE (TEL 2240)

JOB NO. TS1323/24/25 — SCALE 1/50 — LYKES REF. NO. 420013 — MITSUI DRAWING NO. 4100039

(12 SHEETS WITH COVER) 1/12

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG NO. 4100039 2/12

GENERAL NOTE

1 REFERENCE DWG.
1.) PIPING ARR. ON UPP. DK. (DWG NO. 4100001)
2.) PIPING ARR. IN STEERING GEAR ROOM (" 4100025)
3.) PIPING ARR. IN AFT PEAK TK. (" 4100070)
4.) PIPING ARR. ON BHD. (" 4100030)

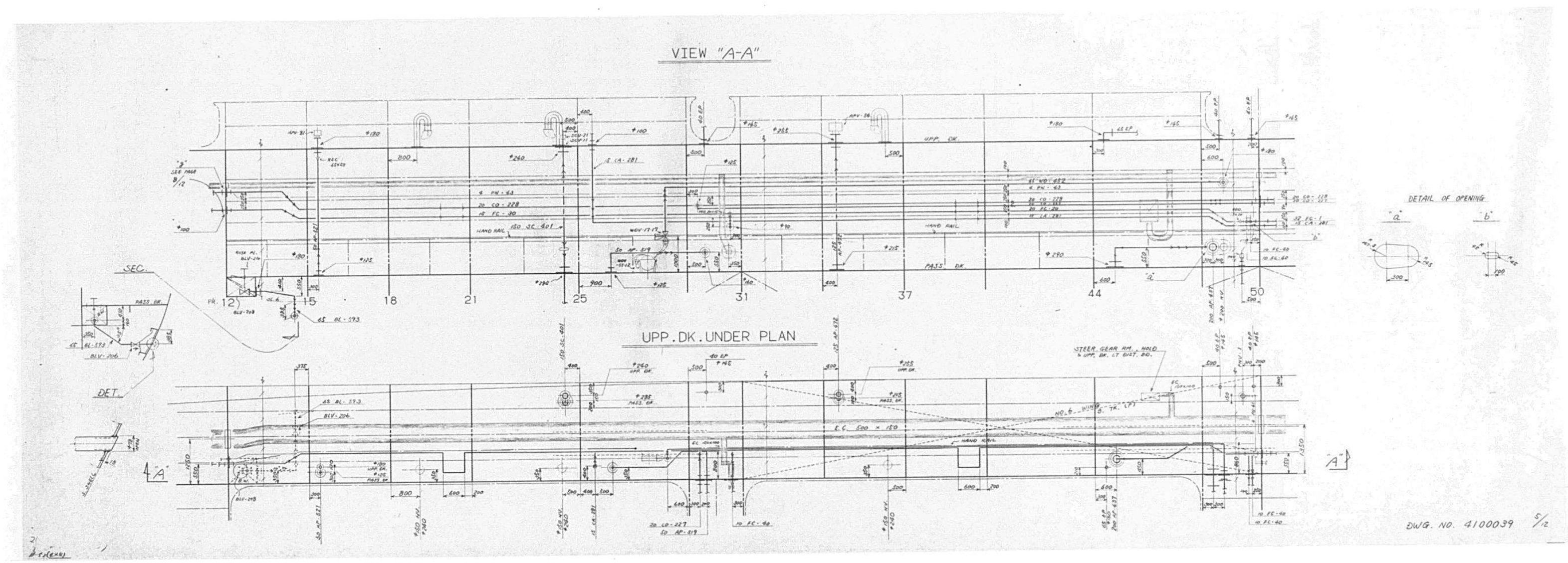
DWG.NO. 4100039 3/12

PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

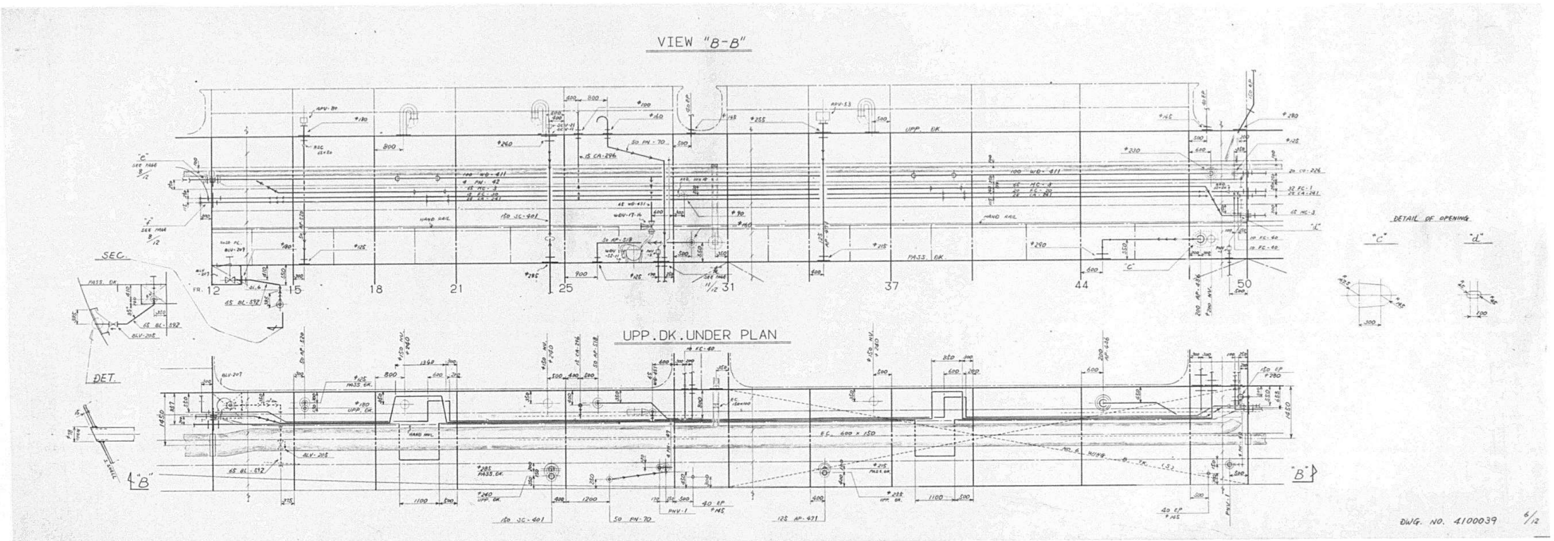
DWG. NO. 4100039 4/12

1556



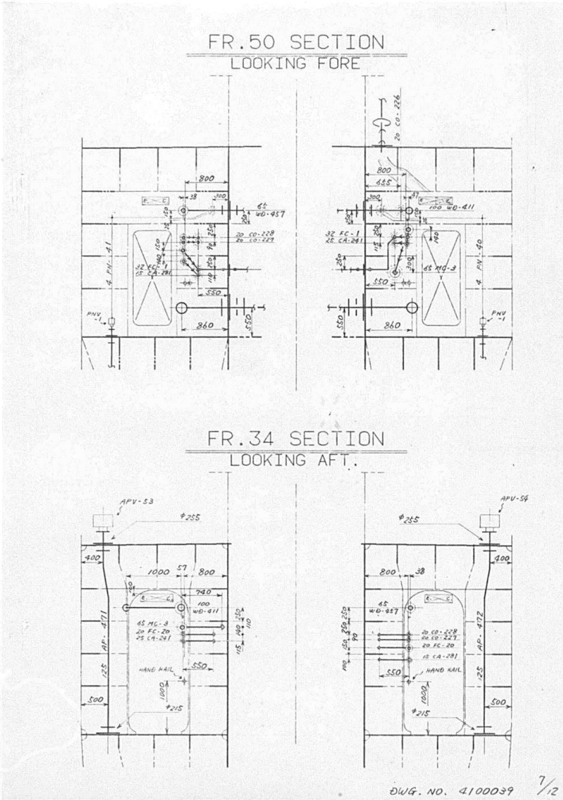
VIEW "A-A"
UPP. DK. UNDER PLAN
DETAIL OF OPENING
SEC.
DET.
DWG. NO. 4100039

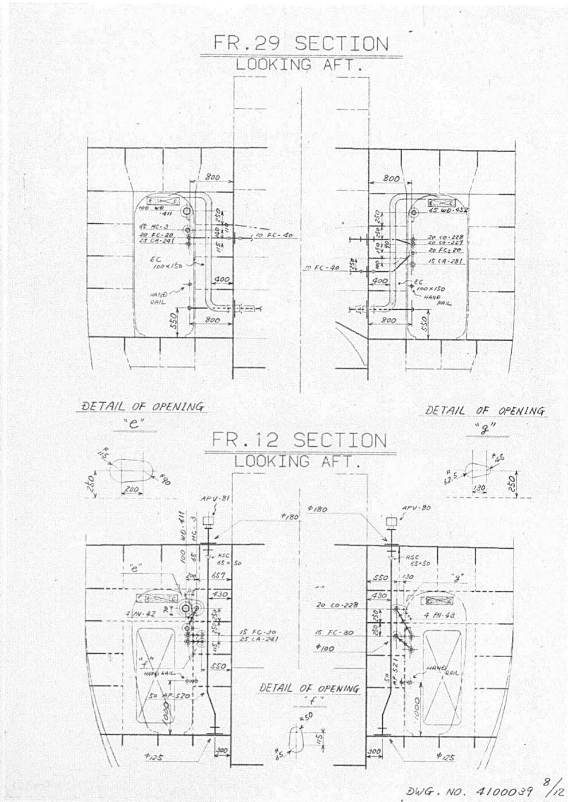
1557

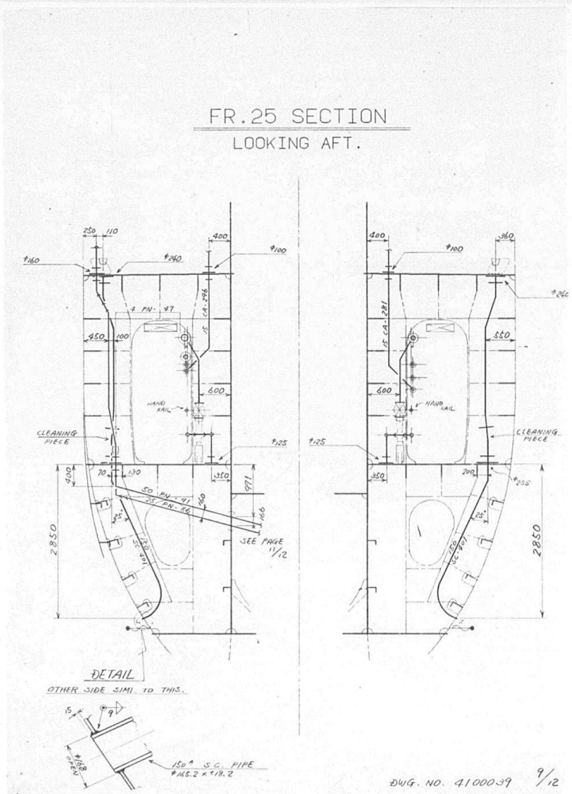


VIEW "B-B"
UPP. DK.
PASS. DK.
HAND RAIL
SEC.
DET.
UPP. DK. UNDER PLAN
DETAIL OF OPENING
"c"
"d"
12
15
18
21
25
31
37
44
50
DWG. NO. 4100039

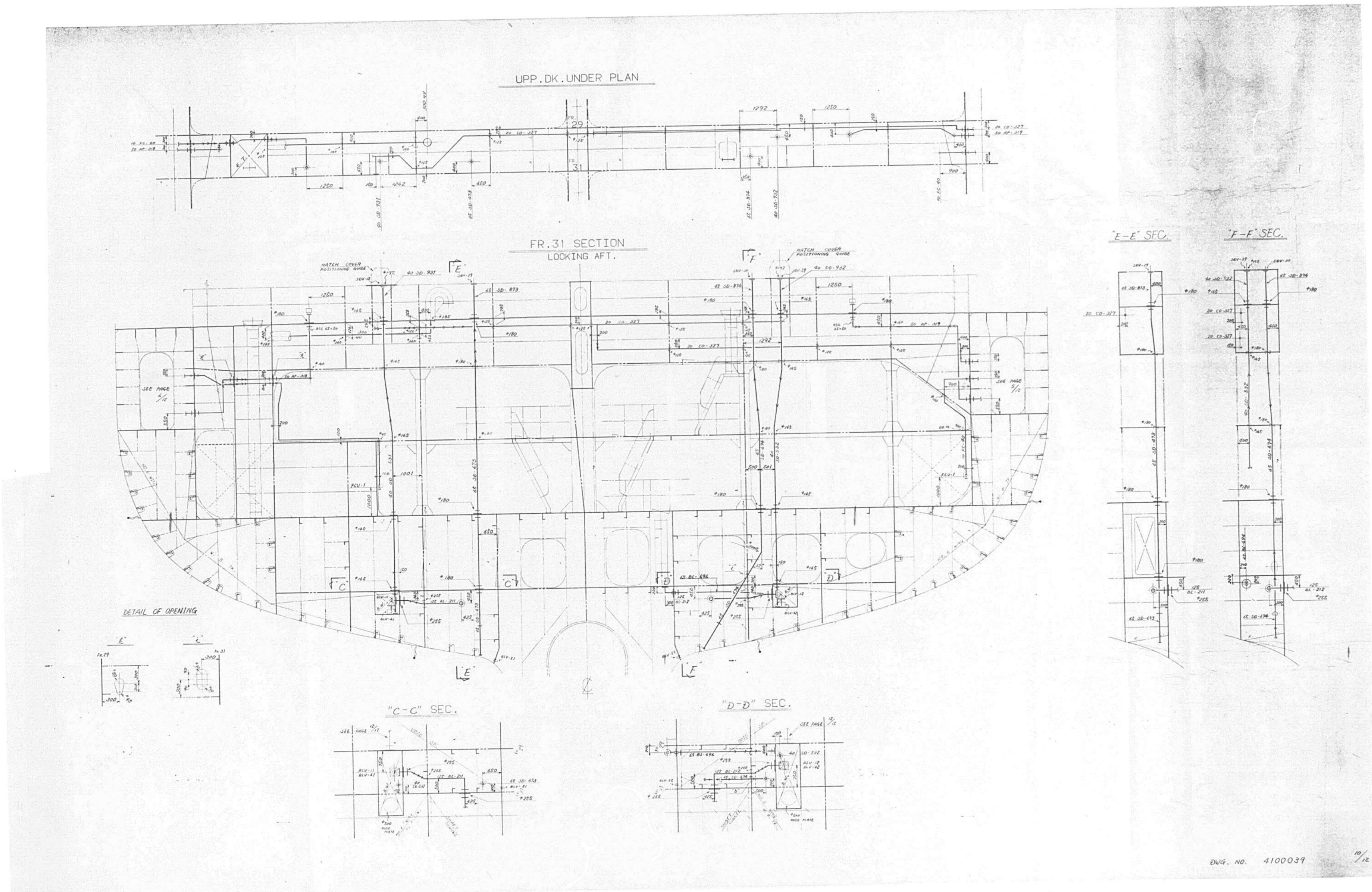
1558


FR.50 SECTION
LOOKING FORE
FR.34 SECTION
LOOKING AFT.
DWG. NO. 4100039 7/12

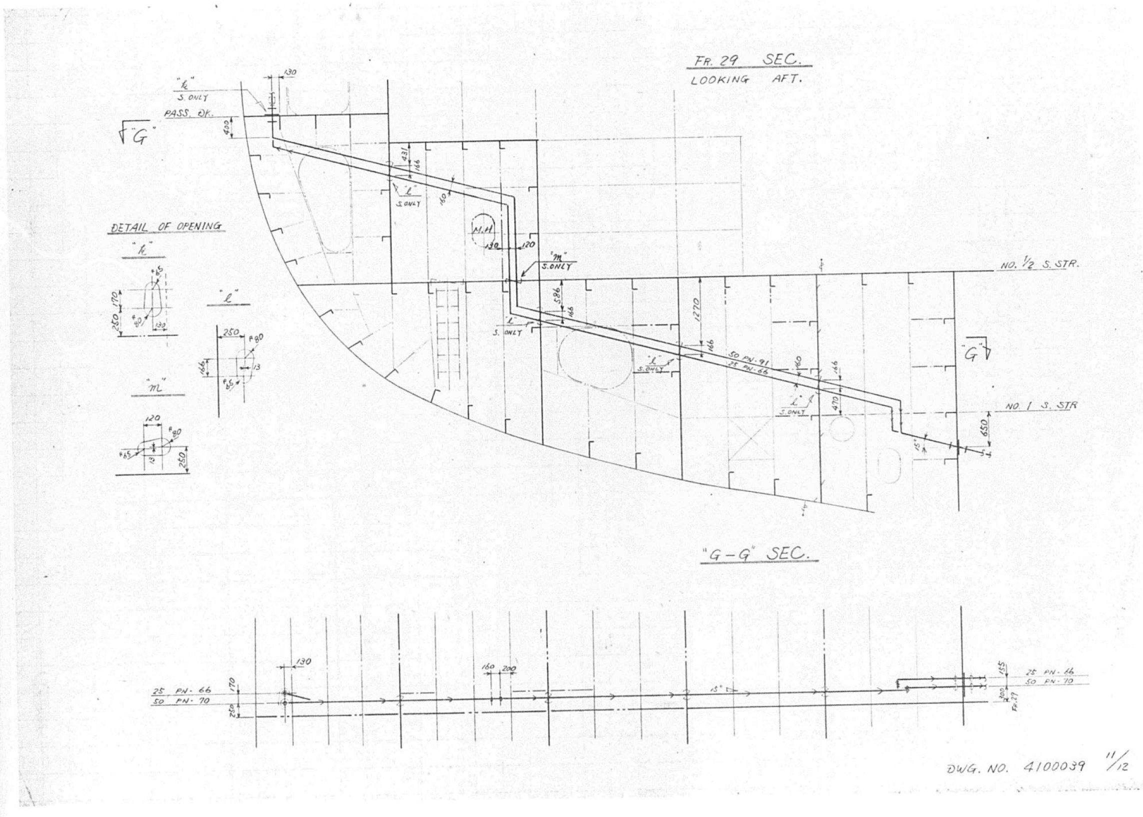

FR.29 SECTION
LOOKING AFT.
DETAIL OF OPENING "e"
DETAIL OF OPENING "g"
FR.12 SECTION
LOOKING AFT.
DETAIL OF OPENING "f"
DWG. NO. 4100039 8/12


FR.25 SECTION
LOOKING AFT.
CLEANING PIECE
SEE PAGE 11/12
DETAIL
OTHER SIDE SIMI. TO THIS.
DWG. NO. 4100039 9/12

1559


UPP.DK.UNDER PLAN
FR.31 SECTION
LOOKING AFT.
"E-E" SEC.
"F-F" SEC.
DETAIL OF OPENING
"C-C" SEC.
"D-D" SEC.
DWG. NO. 4100039
10/12

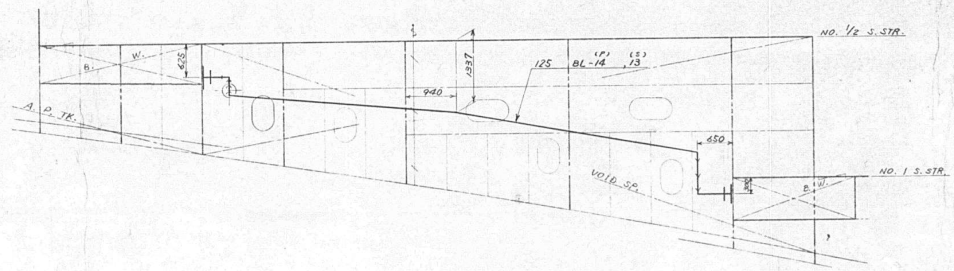
1560



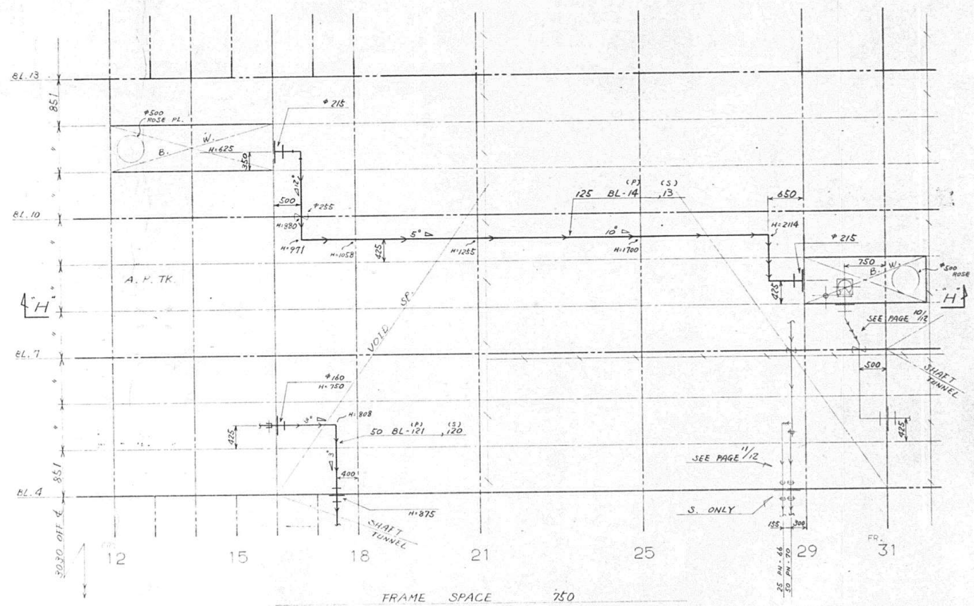
FR. 29 SEC.
LOOKING AFT.
"G"
PASS. OK.
S. ONLY
DETAIL OF OPENING
"K"
"L"
"M"
M.H
NO. 1/2 S. STR.
NO. 1 S. STR
50 PN-91
25 PN-66
"G-G" SEC.
25 PN-66
50 PN-70
DWG. NO. 4100039 11/12

1561

"H-H" SECTION

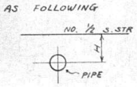


NO.1/2 S.STR.UNDER PLAN



NOTE ;~

1. THIS DRAWING IS SHOWN PORT SIDE. BOTH SIDES TO BE SYMMETRIC EXCEPT SPECIFIED.
2. MARK "H=" ARE SHOWN AS FOLLOWING



FRAME SPACE 750

DWG. NO. 4100039 12/12

1562

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY 20 '86	OTTS/MES/256						

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		~~MITSUBISHI KOBE~~	
NO.1323	DOCTOR LYKES	~~NO.1158~~	~~JAMES LYKES~~
NO.1324	ALMERIA LYKES	~~NO.1159~~	~~JOSEPH LYKES~~
NO.1325	TILLIE LYKES	~~NO.1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC.(PIPING) SEC.CHIEF — ASS. CHIEF — CHARGE — STAFF — DATE (TEL 2240)

第一艙内諸管配置

PIPING ARRANGEMENT IN NO.1 HOLD (INC. COFF.)

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25	1/50	480014	4100037

(7 SHEETS WITH COVER)

1/7

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG. NO. 4100037 2/7

GENERAL NOTE

1 REFERENCE DWG.
1) PIPING ARR. UNDER UPP. DK. PASSAGE (DWG. NO. 4100005)
2) PIPING ARR. ON UPP. DK. (" 4100001)

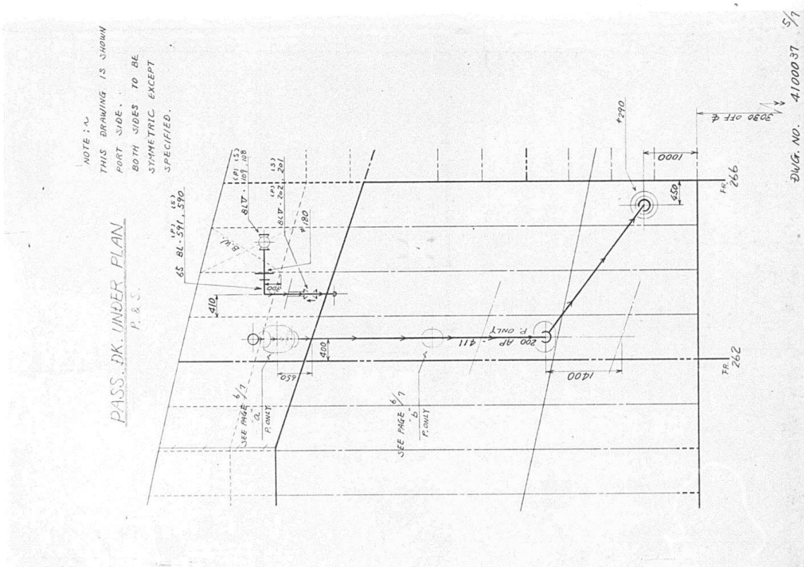
DWG.NO. 4100037 3/7

PIPE LIST

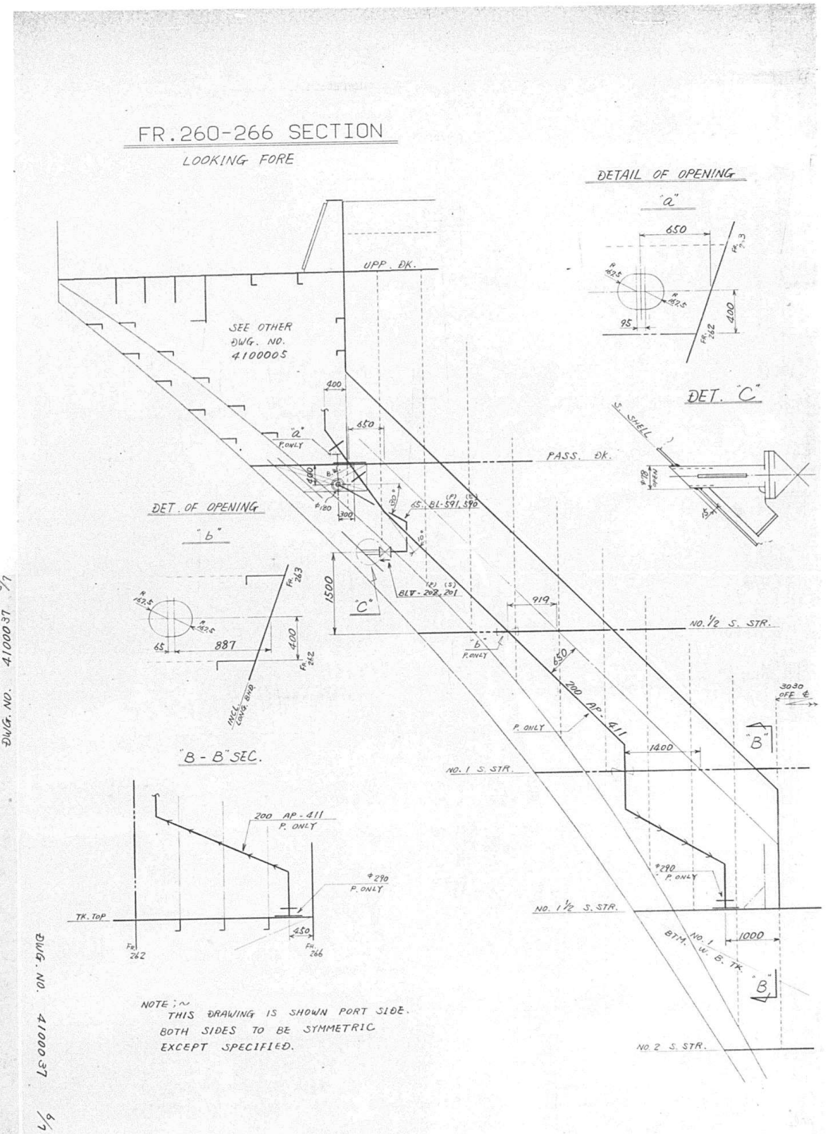
MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

DWG. NO. 4100037 4/7

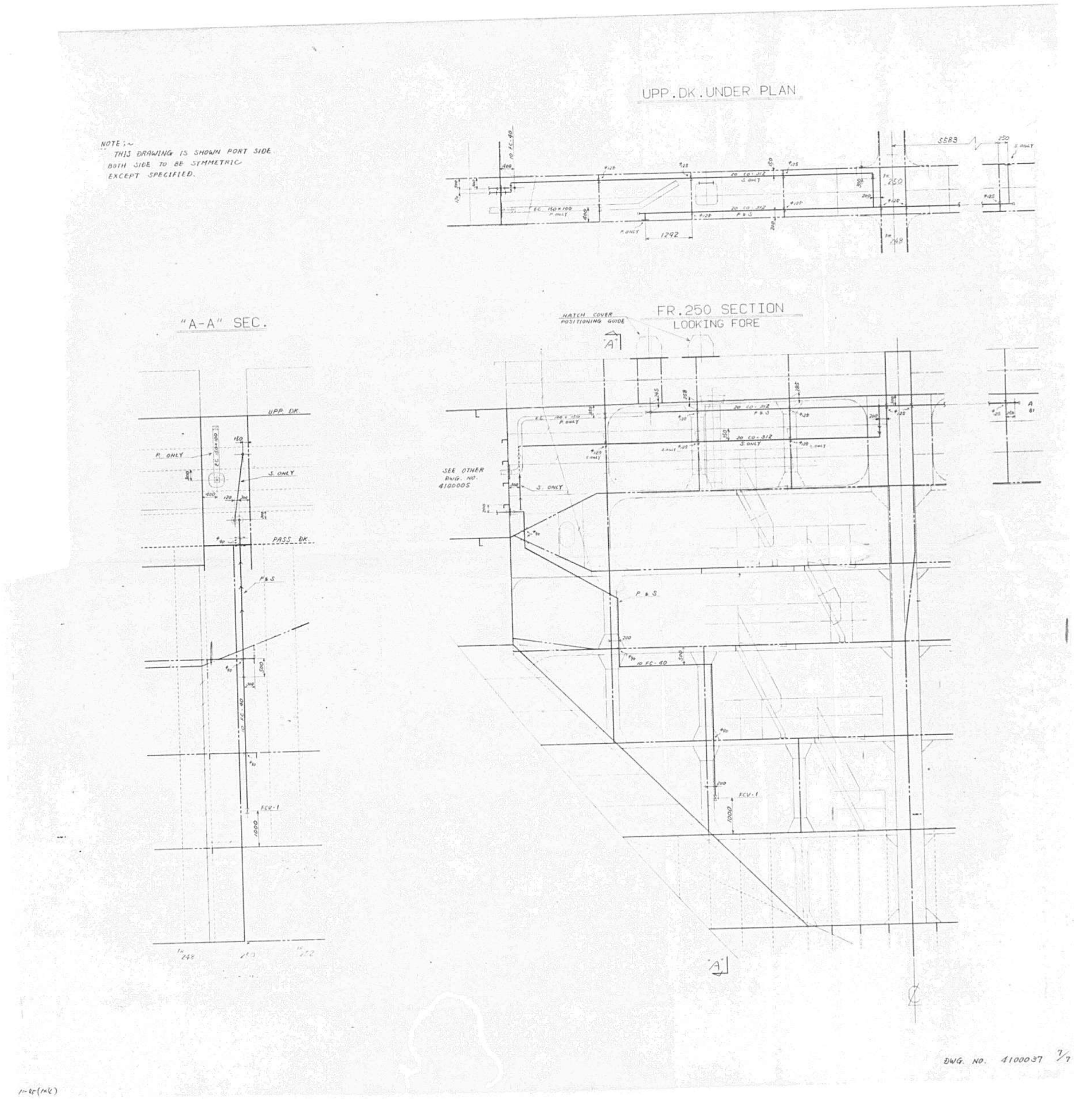
1563



PASS. DK. UNDER PLAN
P. & S.
NOTE ;~
THIS DRAWING IS SHOWN PORT SIDE. BOTH SIDES TO BE SYMMETRIC EXCEPT SPECIFIED.
200 AP - 411
P. ONLY
SEE PAGE "b"
SEE PAGE "a"
FR. 262
FR. 266
DWG. NO. 4100037

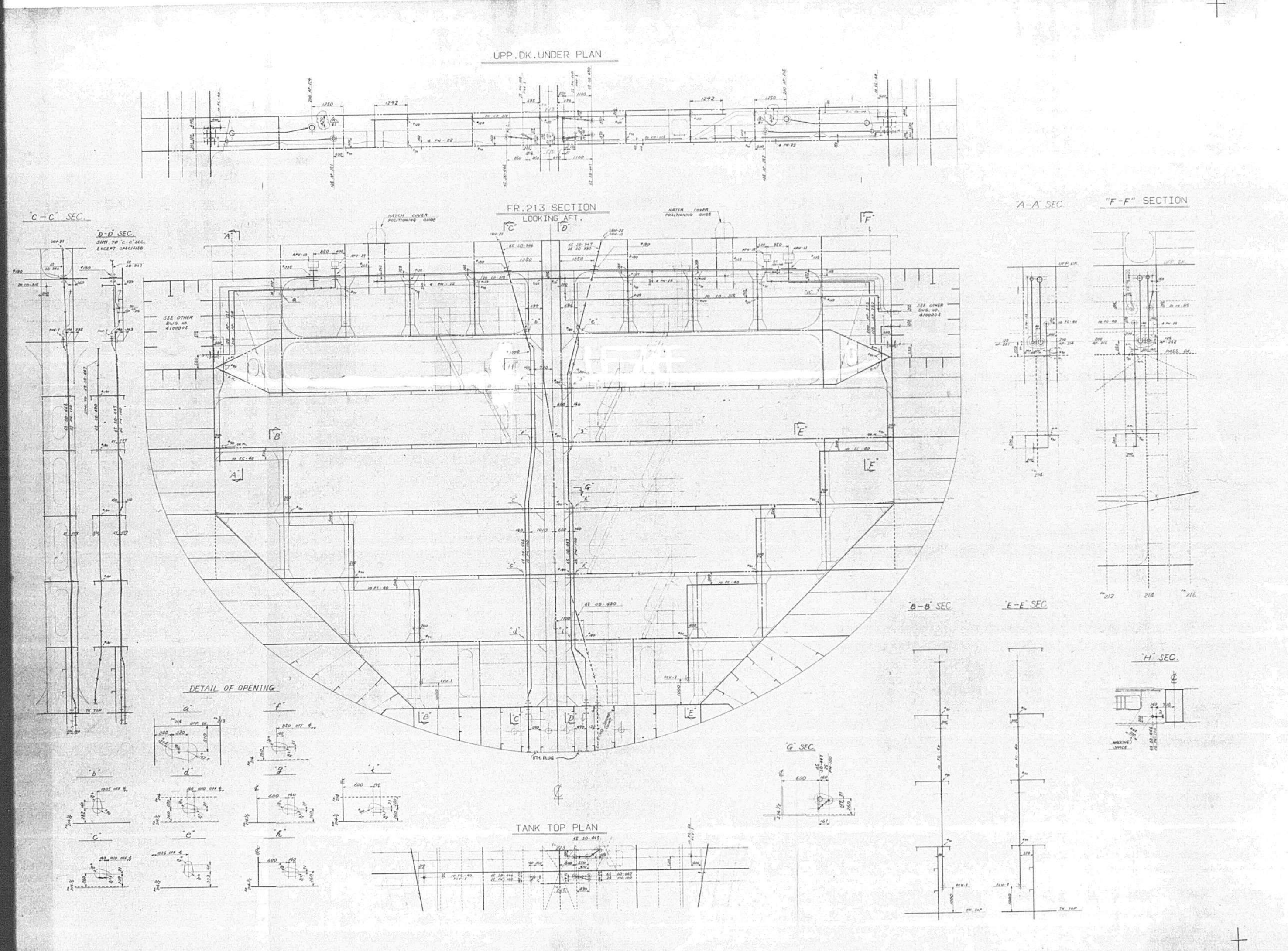


FR.260-266 SECTION
LOOKING FORE
DETAIL OF OPENING "a"
DET. "C"
UPP. DK.
SEE OTHER DWG. NO. 4100005
PASS. DK.
DET. OF OPENING "b"
NO. 1/2 S. STR.
"B - B" SEC.
200 AP - 411
P. ONLY
NO. 1 S. STR.
NO. 1 1/2 S. STR.
TK. TOP
NOTE ;~
THIS DRAWING IS SHOWN PORT SIDE.
BOTH SIDES TO BE SYMMETRIC
EXCEPT SPECIFIED.
NO. 2 S. STR.
DWG. NO. 4100037



UPP.DK.UNDER PLAN
NOTE:-
THIS DRAWING IS SHOWN PORT SIDE
BOTH SIDE TO BE SYMMETRIC
EXCEPT SPECIFIED.
"A-A" SEC.
UPP. DK
PASS. DK
FR.250 SECTION
LOOKING FORE
HATCH COVER
POSITIONING GUIDE
SEE OTHER
DWG. NO.
4100005
DWG. NO. 4100037 7/7

1565



PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S1323 AS FINISHED PLAN MADE APPLICABLE TO S1324 AND S1325	JULY 2 '86

GENERAL NOTE

1. REFERENCE DWG.
   1.) PIPING ARR. UNDER UPP. DK. PASSAGE (DWG. NO. 4100005)
   2.) PIPING ARR. ON UPP. DK. (" 4100001)
   3.) PIPING ARR. IN DOUBLE BOTTOM TK. INC. DUCT KEEL (" 4100050, 51)

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 28 '85	[illegible]				

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO. 1323	DOCTOR LYKES	NO. 1158	JAMES LYKES
NO. 1324	ALMERIA LYKES	NO. 1159	JOSEPH LYKES
NO. 1325	TILLIE LYKES	NO. 1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP'S NAME: TILLIE LYKES

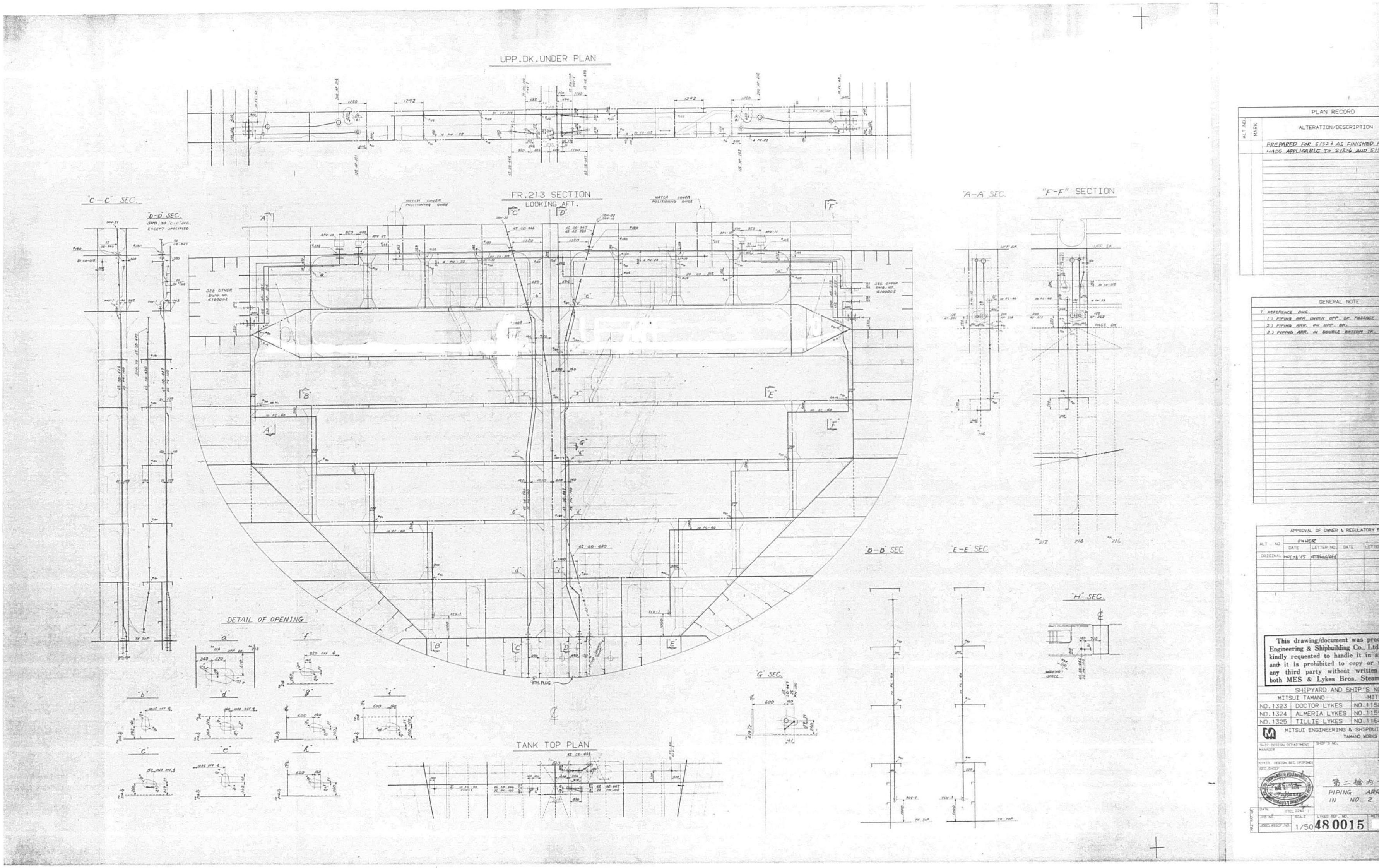
第二艙内諸管配置

PIPING ARRANGEMENT IN NO. 2 HOLD

SCALE: 1/50 | LYKES REF. NO.: 48 0015 | MITSUI DRAWING NO.: 4100038

1/2

1566


UPP. DK. UNDER PLAN
FR. 213 SECTION
LOOKING AFT.
"C-C" SEC.
"D-D" SEC.
"A-A" SEC.
"F-F" SECTION
"B-B" SEC.
"E-E" SEC.
"H" SEC.
"G" SEC.
DETAIL OF OPENING
TANK TOP PLAN
PLAN RECORD
ALTERATION/DESCRIPTION
GENERAL NOTE
APPROVAL OF OWNER & REGULATORY BOD
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SHIPYARD AND SHIP'S NO.
MITSUI TAMANO
NO. 1323 DOCTOR LYKES NO. 1158
NO. 1324 ALMERIA LYKES NO. 1159
NO. 1325 TILLIE LYKES NO. 1164
MITSUI ENGINEERING & SHIPBUILD
TAMANO WORKS
SHIP DESIGN DEPARTMENT
MANAGER
SHIP'S NO.
SEC. CHIEF
PIPING ARRAN
IN NO. 2
DATE
JOB NO.
SCALE
1/50
LYKES REF. NO.
480015

2/2 1567

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY 28 '84	OFTT/MEC/1656						

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	~~NO.1158~~	~~JAMES LYKES~~
NO.1324	ALMERIA LYKES	~~NO.1159~~	~~JOSEPH LYKES~~
NO.1325	TILLIE LYKES	~~NO.1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER | SHIP'S NO. | SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC.(PIPING) SEC.CHIEF / ASS'T CHIEF / CHARGE / STAFF

第三艙内諸管配置
PIPING ARRANGEMENT IN NO. 3 HOLD

DATE (TEL 2240)
JOB NO. TS1323/24/25 | SCALE 1/50 | LYKES REF. NO. 480016 | MITSUI DRAWING NO. 4100041
JOBCLASSIF. NO.

(6 SHEETS WITH COVER)

1/6

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG NO 4100041 2/6

GENERAL NOTE

1 REFERENCE DWG
1) PIPING ARR. UNDER UPP. DK. PASSAGE (DWG. NO. 4100005)
2) PIPING ARR. ON UPP. DK (" 4100001)
3) PIPING ARR. IN DOUBLE BOTTOM TK. INC. DUCT KEEL (" 4100050, 51)

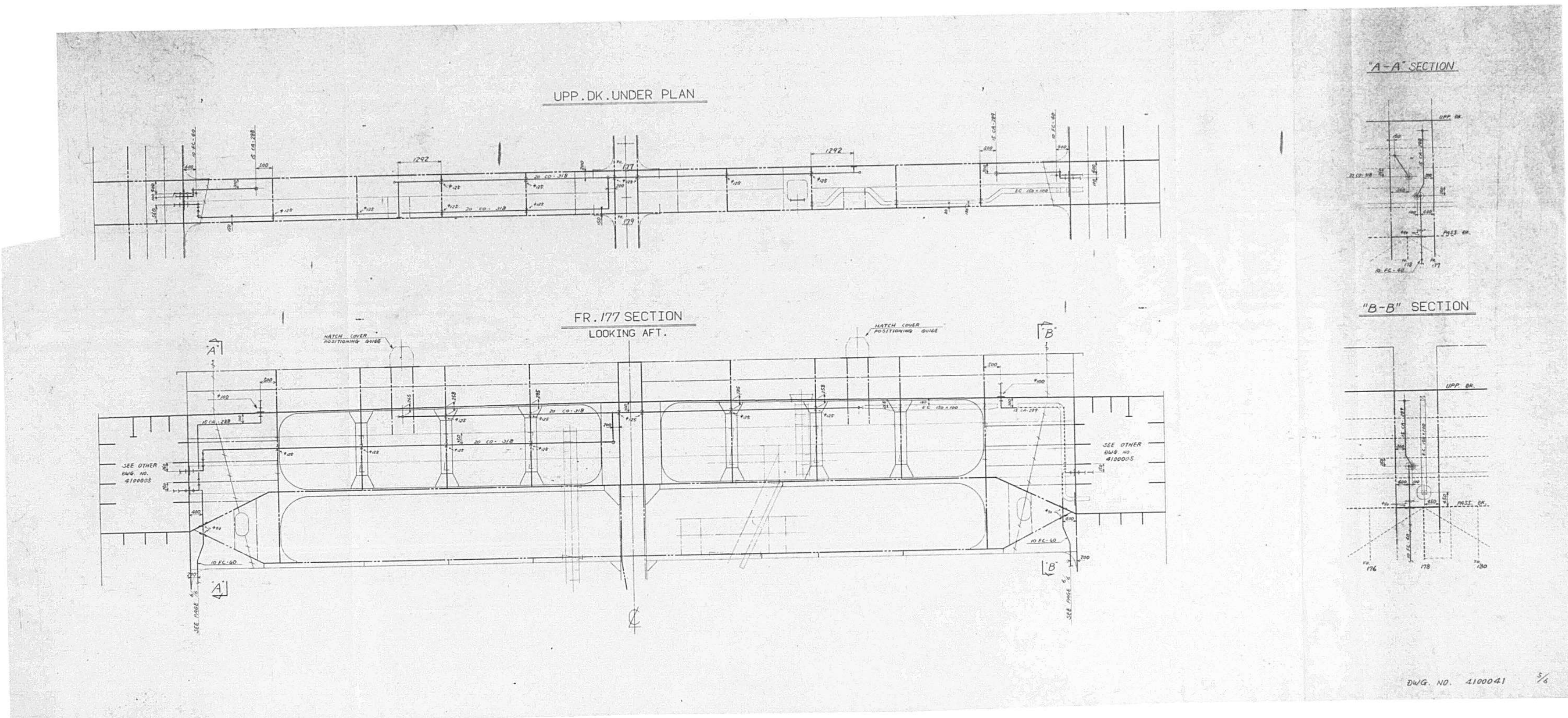
DWG.NO. 4100041 3/6

PIPE LIST

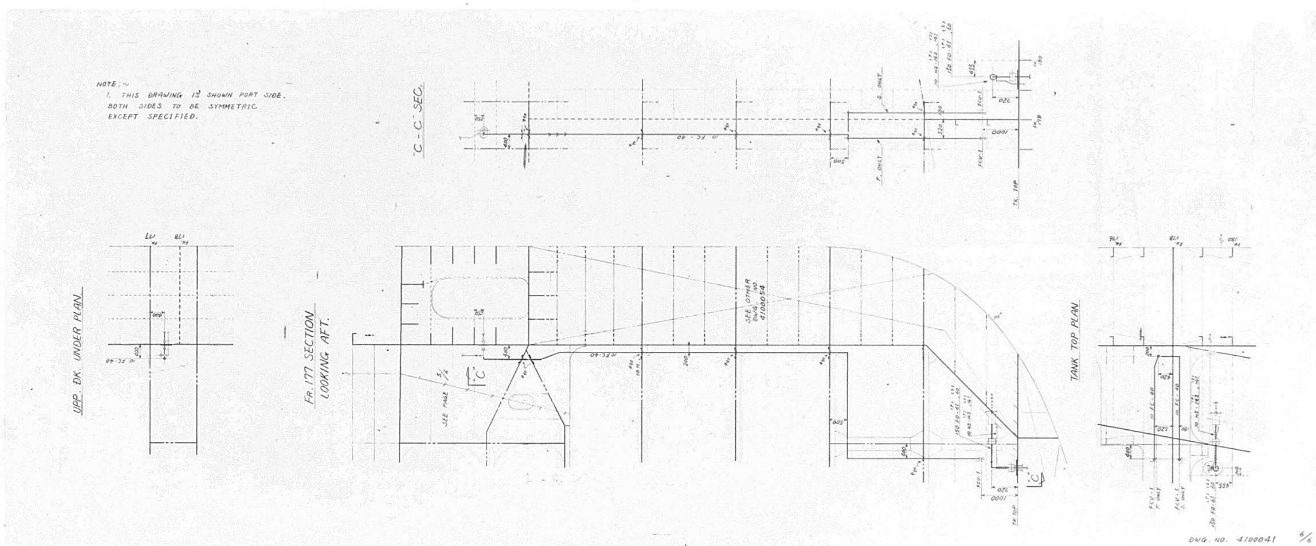
MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

DWG. NO. 4100041 4/6

1568



UPP. DK. UNDER PLAN
FR. 177 SECTION
LOOKING AFT.
HATCH COVER POSITIONING GUIDE
SEE OTHER DWG. NO. 4100005
"A-A" SECTION
"B-B" SECTION
UPP. DK.
DWG. NO. 4100041
5/6


NOTE:~
1. THIS DRAWING IS SHOWN PORT SIDE.
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'C-C' SEC.
UPP. DK UNDER PLAN
FR.177 SECTION
LOOKING AFT.
TANK TOP PLAN
SEE OTHER DWG. NO. 4100056
DWG. NO. 4100041 6/6

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY22 '86	MES-460						

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	~~NO.1158~~	~~JAMES LYKES~~
NO.1324	ALMERIA LYKES	~~NO.1159~~	~~JOSEPH LYKES~~
NO.1325	TILLIE LYKES	~~NO.1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC. (PIPING) SEC. CHIEF — ASSIST. ENGINEER — CHARGE ENGR. — DATE NOV 10 1986 (TEL 2240)

第四艙内諸管配置
PIPING ARRANGEMENT
IN NO. 4 HOLD
(INC. NO. 4 FORE WING W. B. TK.)

JOB NO. TS1323/24/25 — SCALE 1/50 — LYKES REF. NO. 480017 — MITSUI DRAWING NO. 4100042

(8 SHEETS WITH COVER) 1/8

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG NO 4100042 2/8

GENERAL NOTE

1 REFERENCE DWG.
1) PIPING ARR. UNDER UPP. DK. PASSAGE (DWG. NO. 4100005)
2) PIPING ARR. ON UPP. DK. (" 4100001)
3) PIPING ARR. IN DOUBLE BOTTOM TK. INC. BULT KEEL (" 4100050,51)

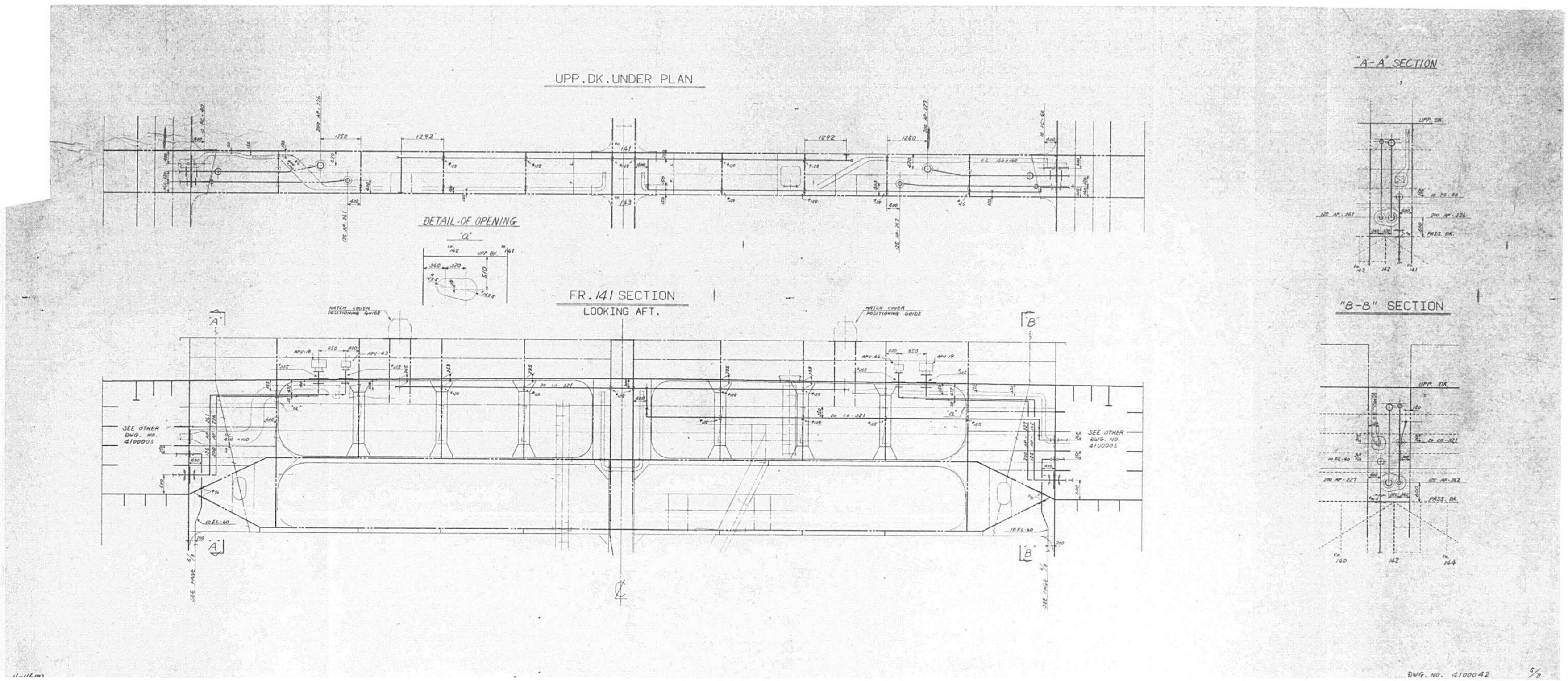
DWG.NO. 4100042 3/8

PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

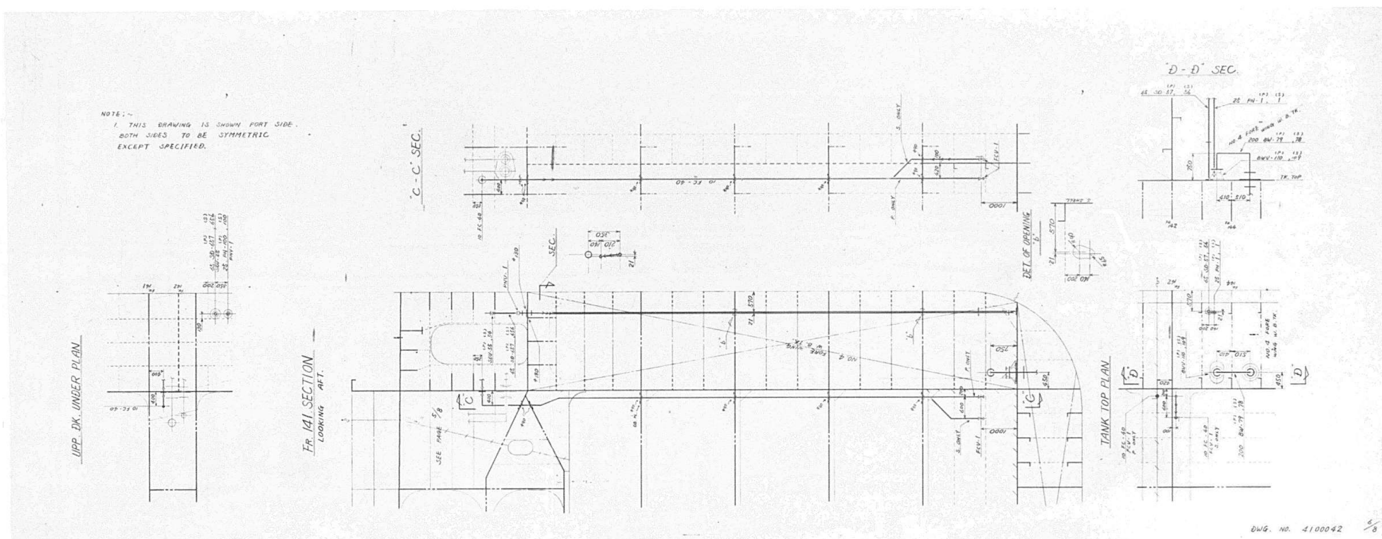
DWG. NO. 4100042 4/8

1571



DWG. NO. 4100042 5/8

1572


NOTE;~
1. THIS DRAWING IS SHOWN PORT SIDE.
BOTH SIDES TO BE SYMMETRIC
EXCEPT SPECIFIED.
'C-C' SEC.
'D-D' SEC.
UPP. DK. UNDER PLAN
FR. 141 SECTION
LOOKING AFT.
DET. OF OPENING
TANK TOP PLAN
DWG. NO. 4100042 6/8

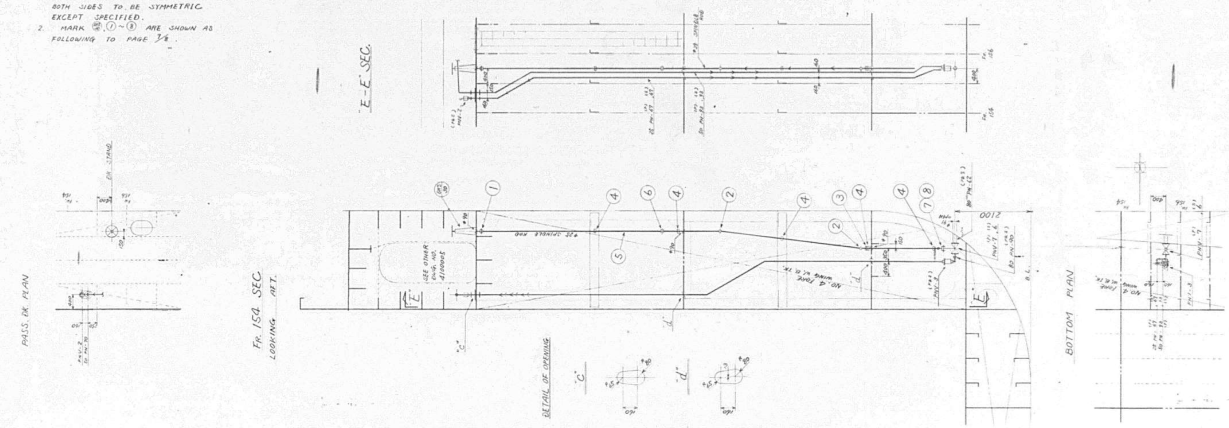
1573

FITTING LIST OF VALVE SPINDLE

SYMBOL	MARK	NAME	MATERIAL: FITTING	MATERIAL: JIS	MATERIAL: [illegible]	SIZE	QUANT.	REMARKS
	[illegible]	[illegible] STAND [illegible] HAND WHEEL [illegible]	BODY SPINDLE [illegible] Bearing	[illegible]	[illegible]	[illegible]	2	
	1	COUPLING (PIN TYPE)	BODY PIN	[illegible]	[illegible]	[illegible]	2	
	2	UNIVERSAL JOINT (PIN TYPE)	BODY PIN	[illegible]	[illegible]	[illegible]	4	
	3	STOPPER	BODY [illegible]	[illegible]	[illegible]	[illegible]		
	4	BEARING	BODY [illegible]	[illegible] RESIN [illegible]	[illegible]	[illegible]		
	5	SPINDLE [illegible]		[illegible]	[illegible]	[illegible]	2	
	6	COUPLING (PIN TYPE)	BODY PIN	[illegible]	[illegible]	[illegible]	2	
	7	PEDAL		[illegible]	[illegible]	[illegible]	2	
	8	SEAT		[illegible]	[illegible]		2	

DWG. NO. 4100042 7/8

NOTE ;
1. THIS DRAWING IS SHOWN PORT SIDE. BOTH SIDES TO BE SYMMETRIC EXCEPT SPECIFIED.
2. MARK [illegible], ①~⑧ ARE SHOWN AS FOLLOWING TO PAGE 7/8 .



DWG. NO. 4100042 8/8

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	21 APR 84	CFTS/MES-212			24 MAY 84	T-8-2		
△	9 JULY 84	CFTS/MES-634			17 MAY 84	T-2-2		
△ 2	—	—			—	—		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: TILLIE LYKES

OUTFIT. DESIGN SEC. (PIPING)
SEC. CHIEF
ASSIST. S. Nishima
DATE (TEL 2240)

ビルジ,バラスト,燃料油管系統図
DIAGRAM OF BILGE, BALLAST & FUEL OIL LINES
INCLUDING ANTI-HEELING SYSTEM

JOB NO. TS1323/24/25 — JOBCLASSIF. NO. D.16.01 — SCALE 1/200 — LYKES REF. NO. 480101 — MITSUI DRAWING NO. 4116201

(35 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 27, '86

DWG. NO. 4116201 3/35

GENERAL NOTE

1. ALL STEEL PIPES EXCEPT FOR F.O. PIPING SHALL BE GALVANIZED.
2. BILGE PIPINGS IN DEEP BALLAST TANKS SHALL BE JOINED WITH WELDED SLEEVE JOINT IN ACCORDANCE WITH USCG REG. (TITLE 46, §56.50-50 (k)) AND DAMAGED PARTS IN THE CAUSE OF WELDING SHALL BE WELL TOUCHED-UP WITH COLD ZINC-RICH PAINT AFTER SURFACE PREPARATION IN ACCORDANCE WITH RESULTS OF DISCUSSION. (HULL PART ITEM 32.)
3. DRESSER TYPE EXPANSION JOINTS SHALL BE USED IN FOLLOWING PIPINGS WHICH ARE LED WITHIN DUCT KEEL.
   b) BALLAST PIPINGS

DWG. NO. 4116201 3-1/35

TS1323/4/5
BILGE SYSTEM IN FWD MACH. SPACE

1. GENERAL
   THE BILGE SYSTEM IN FWD MACHI. SPACE SHALL BE AUTOMATICALLY CONTROLLED BY USING THE BILGE PUMP ($Q = 5\ m^3/hr$) IN ENG. RM.

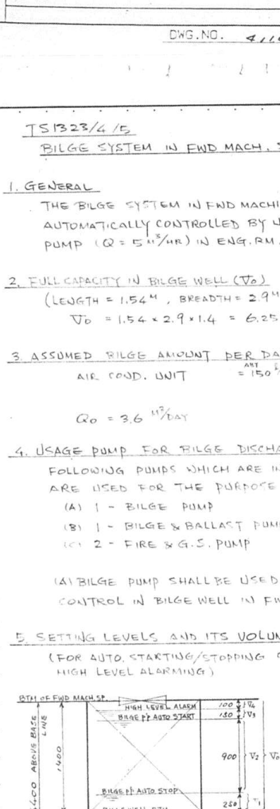
2. FULL CAPACITY IN BILGE WELL (V_0)
   (LENGTH = 1.54 M, BREADTH = 2.9 M, DEPTH = 1.4 M)
   $V_0 = 1.54 \times 2.9 \times 1.4 = 6.25\ m^3$

3. ASSUMED BILGE AMOUNT PER DAY (Q_0)
   AIR COND. UNIT = 150 ANY $\ell/hr \times 24^{hr} = 3600\ \ell/day$
   $Q_0 = 3.6\ m^3/day$

4. USAGE PUMP FOR BILGE DISCHARGING
   FOLLOWING PUMPS WHICH ARE INSTALLED IN ENG. RM. ARE USED FOR THE PURPOSE.
   (A) 1 - BILGE PUMP 5 m^3/hr
   (B) 1 - BILGE & BALLAST PUMP 500 "
   (C) 2 - FIRE & G.S. PUMP 175/265 "

   (A) BILGE PUMP SHALL BE USED FOR AUTOMATIC LEVEL CONTROL IN BILGE WELL IN FWD MACHI. SPACE.

5. SETTING LEVELS AND ITS VOLUME IN BILGE WELL
   (FOR AUTO. STARTING/STOPPING OF BILGE PUMP AND HIGH LEVEL ALARMING)



VOLUME
$V_0 = 6.25\ m^3$
$V_1 = 1.11\ m^3$
$V_2 = 4.02\ m^3$
$V_3 = 0.67\ m^3$
$V_4 = 0.45\ m^3$

三井造船株式会社 DWG. NO. 4116201 3-2/35

1576

6. BILGE DISCHARGE TIME

(1) IN CASE OF MANUAL OPERATION (T_m)

$$T_m = \frac{\nabla_{H.L.A}}{Q_{pump}} \times 60 \text{ (MINUTS)}$$

WHERE

$\nabla_{H.L.A}$ = VOLUME UNTIL HIGH LEVEL ALARM SIGNAL

$= \nabla_1 + \nabla_2 + \nabla_3$

$= 5.14\ M^3$

Q_{pump} = CAPACITY OF BILGE PUMP

$= 5\ M^3/HR$

$$= \frac{5.14}{5} \times 60$$

$= 61.68$ MINUTS

(1.03 HRS)

(2) IN CASE OF AUTOMATIC OPERATION (T_a)

$$T_a = \frac{\nabla_2}{Q_{PUMP}} \times 60 \text{ (MINUTS)}$$

WHERE

∇_2 = VOLUME FROM AUTO.-START. OF BILGE PUMP UNTIL AUTO.-STOP

$= 4.0\ M^3$

$$= \frac{4.02}{5} \times 60$$

$= 48.24$ MINUTS

(0.804 HR)

三井造船株式会社 DWG. NO. 4116 201 3-3/55

REFERENCE				
NO.	REF. NO.		DWG. NO.	DWG. NAME
	MES	LIKES		
REF. 1		480001	4116002	PIPING PRACTICE
2		190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
3		482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
4		482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
5		482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS.
6		482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
7		482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
8		482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
9		482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
10		482608	5131205	GASKET (GENERAL USE)
11		480901	4116701	DIAGRAM OF AIR, SOUNDING & FILL PIPES
12		480302	4116101	DIAGRAM OF FIRE & WASH DECK LINE AND ARRANGE. OF FIRE EXTINGUISHERS
13		481901	4116301	DIAGRAM OF HYDRAULIC OIL PIPE FOR VALVE REMOTE CONTROL SYSTEM
14		480301	5131019	FIRE G.S. & BALLAST PIPING DIAGRAM IN ENGINE ROOM
15		480102	5131020	BILGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENG. RM.
16		481509	5131014	F.O. TRANSFER PIPING DIAGRAM IN ENGINE ROOM
17		482201	4116705	DIAGRAM OF PNEUMACATOR PIPES
18		482401	4116310	VALVE REMOTE CONTROL SYSTEM
19		—	6149473	FLOAT SWITCH (V-TYPE)
20		—	6149474	〃 (H-TYPE)
21		482305	4116214	BELLOWS TYPE EXPANSION JOINT
22		482407	5233114	BRONZE VALVES
23		—	4116213	THERMOMETER
24		480701	4116501	DIAG. OF DRAIN & SOIL PIPE FOR ACCOMM. SP.
25		482306	4116215	DRESSER TYPE EXPANSION JOINTS

DWG NO. 4116201 4/55

PIPING LIST (2/3)

SYSTEM (SERVICE)		MAX. WORK. PRESS	WORK. TEMP.	HYD. TEST PRESS	PIPE MATERIAL		LIST NO. STANDARD	ACT. END	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS. STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
BILGE LINE	IN BALL. TK.	KG/CM²	°C		WELDED CARBON STEEL PIPE STPG38-E JIS G3454	GALVANIZED	BL-1-29	1~8, 13, 14	125	5	139.8	9.5	80	KG/CM² 10	WELDED SLEEVE [SEE REF. 4]	SLEEVE: STS38-S JIS G3455 (EQUIV. TO ASTM A106 GR.B)	II	II
							〃 -30-59	32	100	4	114.3	8.6	〃					
							〃 -90-119	91	65	2½	76.3	7.0	〃					
							〃 -120-149	122	50	2	60.5	5.5	〃					
		3.5	38	SAME PRESS. AS WORK. COND.			〃 -60-89	61	80	3	89.1	7.6	〃					
	IN HOLD	S 8.0 (BILGE EDUCT. DRIV. WTR)			(EQUIV. TO ASTM A53 GR.A)		BL-201-229	214	125	5	139.8	9.5	80		SLIP-ON WELDED FLANGE (IN GENERAL) OR WELDED SLEEVE OR BUTT WELD. OR BELLOWS TYPE EXPANSION JOINT (ONLY IN DUCT KEEL) [SEE REF. 4]	FLANGE: ASTM A36 BELLOWS JOINT: SEE OTHER DWG. 4116214		
							〃 -260-289	261	80	3	89.1	7.6	〃					
							– –				.	.						
	IN DUCT KEEL & VOID SPACE						BL-401-429	408	125	5	139.8	9.5	80					
							〃 -430-459	430, 450, 451	100	4	114.3	8.6	〃					
							〃 -460-489	460	80	3	89.1	5.5	40					
							〃 -490-519	490-492, 496	65	2½	76.3	5.2	〃					
							〃 -520-549	522	50	2	60.5	3.9	〃					
	EXPOSED DK., UND. DK. PASS, BOSUN ST., ST. CR. RM. ETC						BL-660-689	660	80	3	89.1	5.5	40					
							〃 -690-719	692	65	2½	76.3	5.2	〃					
							〃 -720-749	725	50	2	60.5	3.9	〃					
					(SEE REF. 8)		〃 -750-779	750	40	1½	48.6	3.7	〃					
							– –				.	.						
							– –				.	.						

DWG NO. 4116201 55/9

PIPING LIST (1/3)

SYSTEM (SERVICE)		MAX. WORK. PRESS	WORK. TEMP.	HYD. TEST PRESS	PIPE MATERIAL		LIST NO. STANDARD	ACT. END	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS. STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
BALLAST WATER LINE	IN BALL. TKS	KG/CM²	°C		FRP PIPE (SEE PAGE 15/56 ~ 22/56)		BW-10-19	11	350	14	356.6	9.55	-		QUICK-LOCK JOINT OR FLANGE (ONLY PIPES ATTACHED TO PENET. PIECE) (SEE PAGE	FRP 15/56 ~ 22/56)		
							〃 -70-99	72-86, 88-91	200	8	221.0	6.12	-					
							– –				.	.						
		3.0	38	SAME PRESS. AS WORK. COND.			– –				.	.						
	IN DUCT KEEL				WELDED STEEL PIPE JIS G3454 STPG38-E (EQUIV. TO ASTM A53 GR.A)	GALVANIZED	BW-620-639	621	300	12	318.5	9.5	40	KG/CM² 10	SLIP-ON WELDED FLANGE (IN GENERAL) OR WELDED SLEEVE OR BUTT WELD. OR DRESSER TYPE EXPANSION JOINT (ONLY IN DUCT KEEL) [SEE REF. 4]	FLANGE; ASTM A36 OR A105 SLEEVE; STS38-S JIS G3455 (EQUIV. TO ASTM A106 GR.B.) DRESSER JOINT; SEE ATTACHED DWG. PAGE 35/56	II	II
							〃 -670-699	670-682, 688, 689	200	8	216.3	8.2	〃					
							– –				.	.						
							– –				.	.						
							– –				.	.						
							BW-700-729	711	150	6	165.2	18.2	160					
							– –				.	.						
							– –				.	.						
							– –				.	.						
FRESH WATER LINE (FOR SHAFT COOL. TK)	SHAFT COOL. TK & ENG. RM						FW-500	500	40	1½	48.6	3.7	40					
							– –				.	.						
							– –				.	.						
BILGE OVERB. DISCH. PIPE					(SEE REF. 8)		BL-800	800	80	3	89.1	7.6	80					
					SEAMLESS STEEL PIPE JIS G 3455 STS-38 (EQUIV. TO ASTM A106 GR.A)		BL-190-191	191	65	2½	76.3	9.5	160					
							BL-590-593	593	65	2½	76.3	9.5	160					

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FITTING LIST (1/5)

SYMBOL	TYPE	SERVICE	PRESS. RATE KG/CM²	MAX. WORK. PRESS. KG/CM²	WORK. TEMP. °C	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
	REMOTE CONT. BUTTERFLY VALVE (WITH OPENING INDICATOR) (SEE PAGE 23/55)	BALL. W.	10	3.0	38	DUCTILE CAST IRON ASTM A 395 65-45-12	STAINLESS STEEL ASTM A276 -304	STAINLESS STEEL CASTING ASTM A296 -CF8	200	8	24	BWV-1~18, 20~25	S/# 4216211
									300	12	1	BWV-19	
	DO. (WITH OPEN/SHUT INDICATOR) (SEE PAGE 24/55)								350	12	2	BWV-38, 39	
	DO (DO.) (SPRING CLOSE TYPE) (SEE PAGE 25/55)	F. O.		5.5	45	CAST STEEL ASTM A216 WCB	STAINLESS STEEL ASTM A563 -630	STAINLESS STEEL ASTM A351 -CF8M	150	6	4	FOV-1~4	
	GATE VALVE (SEE PAGE 26/55)	F. O.				DUCTILE CAST IRON. FCD45 JIS G 5502 (EQUIVALENT TO ASTM A395)	STAINLESS STEEL SUS 304 JIS G (EQUIV. TO ASTM A276-304)	DUCTILE CAST IRON FCD 45 JIS G 5502 (EQUIV. TO ASTM A395 65-45-12)	200	8	2	FOV-130, 131	S/# 4216213
		D. O.			38				100	4	2	DOV-130, 131	
	GATE VALVE (SEE PAGE 27/55)	BILGE		8.5	38	CAST STEEL SC49 JIS G 5151 (EQUIV. TO ASTM A216 GR WCB)		CAST STEEL JIS G5151 (EQUIV. TO ASTM WCB A216)	80	3	1	(SHIP SIDE VALVE) BLV-127	S/# 4216214 WITH OPEN/SHUT INDICATOR
	LIFT CHECK ANGLE VALVE (SEE PAGE 28/55)			3.5		DUCTILE CAST IRON FCD45 JIS G. 5502 (EQUIV. TO ASTM A395 65-45-12)		CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)	125	5	12	BLV-1~12	S/# 4216223
									100	4	1	BLV-15	
									50	2	3	BLV-16~18	
									80	3	2	BLV-80, 81	
SEE REF 22 OTHER DWG.	GLOBE VALVE	F. O	16	5.5	45	CAST BRONZE BC6 JIS H 5111 (EQUIV. TO ASTM B62)	SEE REF 22	DO:	15	½	2	FOV-135, 136	S/No 4216210
		D. O.							15	½	2	DOV-135, 136	

DWG. NO 4116201 8/55

FITTING LIST (3/5)

SYMBOL	TYPE	SERVICE	PRESS. RATE KG/CM²	MAX. WORK. PRESS. KG/CM²	WORK. TEMP. °C	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
	BELL-MOUTH (SEE PAGE 33/55)	BALL. W.	10	3.0	38	MILD STEEL SS41 JIS G 3101 (EQUIV. TO ASTM A36)	—	—	350	14	2	BWV-123, 124	S/# 4216217
									200	8	21	BWV-102~122	
		F. O.		5.5	45				200	8	2	FOV-105, 106	
									150	6	4	FOV-101~104	
	ROSE BOX (SEE PAGE 34/55)	BILGE		3.5	38				125	5	12	BLV-31~42	S/# 4216228
									100	4	1	BLV-45	
									50	2	3	BLV-46~48	
									65	2½	1	BLV-57	
									80	3	2	BLV-140, 141	
	DRESSER TYPE EXPANSION JOINT (SEE PAGE 35/55)	BALL. W.	5	3.0		DUCTILE CAST IRON FCD 45 JIS G 5502 (EQUIV. TO ASTM A395 65-45)	—	—	300	12	12	BWV-70	S/# 4216215 THESE ARE PROVIDED IN DUCT KEEL

DWG. NO 4116201 10/55

PIPING LIST (3/3)

SYSTEM (SERVICE)		MAX. WORK. PRESS. KG/CM²	WORK. TEMP. °C	HYD. TEST PRESS.	PIPE MATERIAL		LIST NO. STANDARD	LIST NO. ACT.	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	JOINT PRESS. STD. KG/CM²	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
F.O. LINE	IN F.O.TK.	5.5	45	8.3	WELDED STEEL PIPE STPG38-E JIS G3454 (EQUIV. TO ASTM A53 GR.A)	NOT GALVANIZED	FO-60-89	61	200	8	216.3	8.2	40	10	SLIP-ON WELDED FLANGE (IN GENERAL) OR WELDED SLEEVE OR BUTT WELD OR BELLOWS TYPE EXPANSION JOINT (ONLY IN DUCT KEEL)	FLANGE: ASTM A36 OR A105 SLEEVE; STS38-S JIS G3455 EQUIV. TO ASTM A106 GR.B BELLOWS JOINT; SEE OTHER DWG. 4116214	II	II
							〃-90-119	93	150	6	165.2	7.1	〃					
							- -											
STEAM TRACING WITH INSULATION	IN DUCT KEEL & HOLD						FO-430-459	431	250	10	267.4	9.3	40					
							〃-150-199	153	150	6	165.2	7.1	〃					
							- -											
							FO-490-493	493	150	6	165.2	11.0	80					
							- -											
	EXPOSED DK.						FO-230-259	231	200	8	216.3	8.2	40					
							- -											
D.O. LINE							DO-230-239	231	100	4	114.3	6.0	40					
							- -											
L.O. LINE							LO-1-2	2	100	4	114.3	6.0	40					
							〃-3-19	11	80	3	89.1	5.5	40					
							- -											
							- -											
					(SEE REF. 8)		- -								(SEE REF. 4)			
							- -											
							- -											

DWG. NO. 4116201 7/55

FITTING LIST (2/5)

SYMBOL	TYPE	SERVICE	PRESS. RATE KG/CM²	MAX. WORK. PRESS. KG/CM²	WORK. TEMP. °C	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
	SCREW-DOWN STOP CHECK GLOBE VALVE (SEE PAGE 29/55)	BILGE	10	3.5	38	DUCTILE CAST IRON FCD 45 JIS G 5502 (EQUIV. TO ASTM A395)	STAINLESS STEEL SUS 304 (EQUIV. TO ASTM A276 - 304)	CAST BRONZE BC6 JIS H 5111 (EQUIV. TO ASTM B62)	50	2	1	BLV-123	S/# 4216213
	SCREW-DOWN STOP CHECK ANGLE VALVE (SEE PAGE 30/55)								50	2	1	BLV-24	
									100	4	1	BLV-76	
	GLOBE VALVE (SEE PAGE 31/55)								65	2½	1	BLV-120	
									50	2	3	BLV-126, 130, 131	
	GLOBE VALVE (REF NO. 22)		16	8.5		CAST BRONZE BC6 JIS H 5111 (EQUIV. TO ASTM B62)	REF NO. 22		40	1½	1	BLV-121	S/# 4216224
	SWING CHECK VALVE (SEE PAGE 40/55, 41/55)		10			DUCTILE CAST IRON FCD45 (EQUIV. TO ASTM A395)	STAINLESS STEEL SUS 304 (EQUIV. TO ASTM A276 304)		80	3	1	BLV-126	S/# 4216213
									65	2½	1	BLV-125	
	GLOBE VALVE (SEE PAGE 32/55)					CAST STEEL (EQUIV. TO ASTM A216 GR WCB)		STAINLESS STEEL CASTING JIS G5121/5151 (EQUIV. TO ASTM A351-CF8)	65	2½	6	BLV-201~206	S/# 4216214
									65	2½	6	BLV-20~23, 207, 208	
	THERMOMETER (-20~100°C)	F. O.	10	5.5	45	SEE OTHER PLAN REF. 23			15	½	2	FOV-137, 138	S/No 4216231

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FITTING LIST (5/5)

SYMBOL	TYPE	SERVICE	PRESS. RATE KG/CM²	MAX. WORK. PRESS. KG/CM²	WORK. TEMP. °C	MATERIAL BODY	~~STEM~~	~~DISC~~	NOM. DIA. MM	INCH	QTY.	LIST NO.	REMARKS
	DISTANCE PIECE WITH BLANK FLANGE (SEE PAGE 43/55~44/55)	BILGE	10.5		38	MILD STEEL SS41 JIS G 3101 [EQUIV. TO ASTM A36] & STPG38-E JIS G 3454 [EQUIV. TO ASTM A53 GR. A]	—	—	50	2	2	BLV-132, 133	S/# 4216227
		D.O.	10 & ANSI 150LB	5.5	45				100	4	2	DOV-132, 133	
	BLANK FLANGE (SEE PAGE 45/55~47/55)	L.O.	ANSI 150LB						100	4	2	LOV-136~137	
									80	3	3	LOV-138~140	
		F.O.							200	8	2	FOV-132,133	
LAH/PN	HIGH LEVEL ALARM (DETECTED BY PNEUMATIC TK LEVEL GAUGE) (SEE REF. 17,18)	F.O.	—	—	45	SEE OTHER PLAN (REF. 17&18)					6	FOR NO.3 WING & DEEP.F.O.TKS	
LAH	HIGH LEVEL ALARM (DETECTED BY FLOAT SWITCH) (SEE REF. 19)	BILGE	—	—	38	SEE OTHER PLAN (REF. 19)					1	FOR FWD MACH. SP BILGE WELL	記載/計画
LAL	LOW LEVEL ALARM DETECTED BY FLOAT SWITCH (SEE REF. 20)	BALL	—	—	38	SEE OTHER PLAN (REF. 20)					2	FOR ANTI-HEEL TK	

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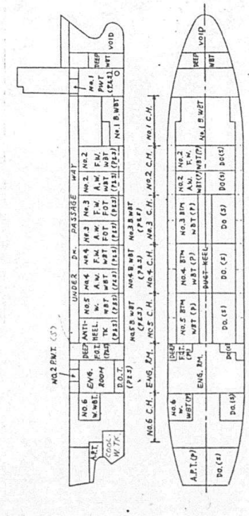
***** CAPACITY TABLE *****



I T E M	(CUB. M)
NO.3 F.W.FOT (P&S)	1010.
NO.3 A.W.FOT (P&S)	1080.
DEEP FOT (P&S)	1010.
(FUEL O. TK. TOTAL)(	3100.)

I T E M	(CUB. M)
DOT (P&S)	200.
(DIESEL O. TK. TOTAL)(	200.)

I T E M	(CUB. M)
DEEP WBT	300.
NO.1 BTM WBT	1290.
NO.2 F.W.WBT (P&S)	1200.
NO.2 A.W.WBT (P&S)	1500.
NO.3 BTM WBT (P&S)	750.
NO.4 BTM WBT (P&S)	1200.
NO.4 F.W.WBT (P&S)	980.
NO.4 A.W.WBT (P&S)	1100.
NO.5 BTM WBT (P&S)	1020.
NO.5 WG. WBT (P&S)	1090.
ANTI-HEEL.T. (P&S)	1180.
NO.6 WG. WBT (P&S)	1140.
A.P.T. (P&S)	900.
(SALLAST W. TK. TOTAL)(	13650.)

I T E M	(CUB. M)
NO.1 PWT (P&S)	200.
NO.2 PWT	100.
(POTABLE W.T. TOTAL)(	300.)

	SPECIFIC GRAVITY	FILLING RATE
FUEL OIL	0.950	0.980
DIESEL OIL	0.880	0.980
POTABLE WATER	1.000	1.000
BALLAST WATER	1.025	1.000

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FITTING LIST (4/5)

SYMBOL	TYPE	SERVICE	PRESS. RATE KG/CM²	MAX. WORK. PRESS. KG/CM²	WORK. TEMP. °C	MATERIAL			NOM. DIA. MM	INCH	QTY.	LIST NO.	REMARKS
	EDUCTOR (SEE PAGE 36/55)		10	8.0	38	BODY: DUCTILE CAST IRON FCD45 JIS G 5502 [EQUIV. TO ASTM A395 65-45-12]	NOZZLE: STAINLESS STEEL SUS 304 [EQUIV. TO ASTM A276 -304]		40×50×65	1½×2×2½	1	(TYPE FC-ER-50H) BLV-19	S/# 4216216
									40×50×65	"	1	(TYPE FC-ER-50L) BLV-122	
						SEE ATTACHED DWGS. PAGE 37/56 ~ 42/56							
—	ROSE PLATE FOR BILGE WELL OR BILGE HAT (SEE PAGE 38/55~40/55)	BILGE							500 ⌀	-	16	(FOR HOLD) BLV-91~104, 118, 119	S/# 4216218
									400 ⌀	-	6	(FOR UND. DK. PASS.) BLV-108~111, 209, 210	
									300 ⌀	-	4	BLV-112~115	
⊘	ROSE PLATE FOR DRAINAGE (SEE PAGE 41/55)		—	—	38				100	4	2	BLV-106, 107	
									50	2	1	BLV-211	
									65	2½	1	BLV-250	
	DRAIN PLUG (SEE PAGE 42/55)								M24	-	4	BLV-49~52	S/# 4216226
	PRESS GAUGE	F.O. & D.O.	10	5	45		MAKER STD.			3/8"	1	FOV-139	S/NO 4216232 INCL. INVENTORY
										3/8"	1	DOV-140	

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FITTING LIST (5-1/5)

SYMBOL	TYPE	SERVICE	PRESS. RATE KG/CM²	MAX. WORK. PRESS. KG/CM²	WORK. TEMP. °C	MATERIAL BODY	STEM	DISC	NOM. DIA. MM	INCH	QTY.	LIST NO.	REMARKS
	BELLOW TYPE EXPANSION JOINT (SEE PAGE 37/55)	BILGE	10	3.5	38	SEE OTHER PLAN REF 21			125	5	20	BLV-170	S/NO 4216230
									100	4	3	BLV-171	
									50	2	3	BLV-172	
		F.O		5.5	45				250	10	8	FOV-50	
		BALLAST		3.0	38				200	8	1	BWV-71	
LAH	HIGH LEVEL ALARM (DETECTED BY FLOAT SWITCH)	BILGE	—	—	—						2	FOR DUCT KEEL	記載 FSU

DWG. NO. 4116201 55/2-21

CALCULATION OF BILGE SUCTION PIPE

CLASS	RULE'S REQUIRED INTERNAL DIAMETER (d)	
	MAIN BILGE PIPE	BRANCH BILGE PIPE
USCG	d=1+SQRT(L*(B+D)/2500)	d=1+SQRT(C*(B+D)/1500)
ABS	d=1.68*SQRT(L*(B+D))+25	d=2.16*SQRT(C*(B+D))+25

WHERE
d=REQUIRED INTERNAL DIAMETER OF PIPE (INCH) or (MM)
L=LENGTH OF SHIP 805.9 (FEET) 245.0 (M)
B=BREADTH OF SHIP 105.9 (FEET) 32.2 (M)
D =DEPTH OF SHIP 61.8 (FEET) 18.8 (M)
C=LENGTH OF COMPARTMENT (FEET) or (M)

APPLICATION OF PIPE

COMPARTMENT	CALCULATION C (M) / (FEET)	d ABS (MM)	d USCG (INCH)	INSTALLATION NOMI. DIA. (MM) / (INCH)	OUT. DIA. (MM) / (INCH)	THICK. (MM) / (INCH)	INTER. DIA. (MM) / (INCH)	REMARKS (PIPE SCH. NO.)
NO. 1 HOLD	29.5	108.8		125.0	139.8	9.5	120.8	
	96.8		4.3	4.9	5.5	0.4	4.8	
NO. 2 HOLD	29.5	108.8		125.0	139.8	9.5	120.8	
	96.9		4.3	4.9	5.5	0.4	4.8	sch.80
NO. 3 HOLD	29.5	108.8		125.0	139.8	9.5	120.8	
	96.9		4.3	4.9	5.5	0.4	4.8	
NO. 4 HOLD	29.5	108.8		125.0	139.8	9.5	120.8	
	96.9		4.3	4.9	5.5	0.4	4.8	
NO. 5 HOLD	30.9	110.8		125.0	139.8	9.5	120.8	
	101.5		4.4	4.9	5.5	0.4	4.8	
NO. 6 HOLD	28.5	107.3		125.0	139.8	9.5	120.8	
	93.5		4.2	4.9	5.5	0.4	4.8	
FWD. MACH. SP	16.2	87.0		100.0	114.3	8.6	97.1	
	53.1		3.4	3.9	4.5	0.3	3.8	

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Bondstrand® Series 2000-M Pipe
Engineering Guide

Pipe

Bondstrand Series 2000-M epoxy pipe is filament-wound using continuous glass filaments and epoxy resins to form a strong, uniform pipe wall over a 0.020-inch (0.5-mm) reinforced corrosion-resistant liner. The pipe is available in 2- through 36-inch (50- through 900-mm) diameters conforming to steel pipe outside diameters and in 14- through 36-inch (350- through 900-mm) diameters conforming to metric cast iron pipe outside diameters. It is intended for applications at temperatures up to 150°F (66°C).

This pipe is designed to withstand external pressure plus suction near the bottom of fluid-filled cargo or ballast tanks. When tested in accordance with ASTM Method D2924, Series 2000-M pipe at 150°F (66°C) resists an external pressure of at least 120 feet (37 meters) of water plus 75 percent vacuum. The designs provide a safety factor of 2 to collapse.

Fittings and Flanges

A complete line of Series 2000-M fittings and flanges is available in sizes 2 through 12 inches (50 through 300 mm). In larger diameters, fittings may be either fiberglass or metal, joined to the pipe using flanges or mechanical joints as described below.

Joints

Series 2000-M pipe and fittings may be joined using Ameron's Quick-Lock® bonded bell and spigot joints or flanged connections in 2- through 12-inch (50- through 300-mm) diameter. Pipe in all sizes may be joined using mechanical joints designed to fit steel pipe outside diameters or metric cast iron outside diameters.

1. Quick-Lock joints are assembled using Bondstrand RP-34, a thermosetting epoxy adhesive with excellent proven strength and performance. Joints assembled and cured in accordance with Ameron's instructions are as strong as the pipe under most loading conditions. A "pipe stop" in the bell end ensures predictable laying lengths for quality pipe assembly.

2. Flanges match the bolt hole size and pattern of ANSI Standard B16.1 for 125-pound cast iron flanges, and ISO International Standard 2229 and ANSI Standard B16.5 for 150-pound steel flanges.

Filament-wound flanges may be drilled to comply with ISO International Standard 2084, NP 10; German Standards DIN 2632 and DIN 2633, ND 10; British Standard BS-4504, 10 bar; and Japanese Standard JIS B 2212, 10 kg/cm² on special order. Bondstrand filament-wound epoxy flanges may be bolted against raised-face steel flanges without spacers provided a torque wrench is used.

3. Mechanical joints, such as Dresser, Viking-Johnson, Baker, Straub and others, which by means of an elastomeric gasket or gland are designed to seal against the outside diameter of steel or cast iron pipe, will also work with Bondstrand Series 2000-M pipe pipe although machining or shaving of the pipe ends may be necessary. Contact your Ameron representative for further information.

Table 1
Physical Properties of Bondstrand Series 2000-M Pipe

	at 70°F (21°C)	at 150°F (66°C)
Circumferential		
Tensile stress, at weeping (ASTM D 1599)*	18,500 psi (128 N/mm²)	—
Modulus (Ameron)	3.65 x 10⁶ psi (25,200 N/mm²)	3.44 x 10⁶ psi (23,700 N/mm²)
Poisson's ratio (Ameron)	0.56	0.60
Longitudinal (ASTM D 2105)		
Tensile strength*	8,500 psi (59 N/mm²)	7,800 psi (54 N/mm²)
Modulus	1.60 x 10⁶ psi (11,000 N/mm²)	1.35 x 10⁶ psi (9,300 N/mm²)
Poisson's ratio	0.37	0.39
Beam (ASTM D 2925)		
Apparent elastic modulus	1.70 x 10⁶ psi (11,700 N/mm²)	1.30 x 10⁶ psi (9,000 N/mm²)
Coefficient of Linear Thermal Expansion	10 x 10⁻⁶ in./in./°F (18 x 10⁻⁶ m/m/°C)	
Coefficient of Thermal Conductivity	2.3 Btu·in./h·ft²·°F (0.33 W/m·K)	

*Divide indicated stresses by a suitable factor, usually 3, to obtain an allowable design stress.

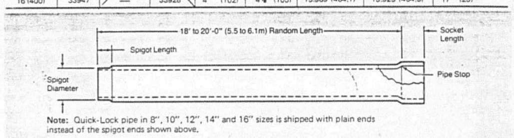
Ameron®

DWG NO. 4116201 15/55

~~Appendix A~~
Quick-Lock and Plain End Marine Pipe

Quick-Lock Socket One End, Spigot Other End

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Socket Length in. (mm)	Spigot Length in. (mm)	Spigot Diameter Min. in. (mm)	Max. in. (mm)	Approx. Weight lb/ft (kg/m)
2 (50)	34002	34097	33858	1 13/16 (46)	2 (51)	2.330 (59.2)	2.346 (59.6)	0.8 (1.2)
3 (80)	34003	—	33859	1 13/16 (46)	2 (51)	3.450 (87.6)	3.466 (88.0)	1.2 (1.9)
4 (100)	34004	—	33860	1 13/16 (46)	2 (51)	4.430 (112.5)	4.446 (112.9)	2.0 (3.0)
6 (150)	34005	—	33861	2¼ (57)	2⅜ (60)	6.544 (166.2)	6.560 (166.6)	3.1 (4.6)
8 (200)	34242	—	34246	2½ (64)	2⅝ (67)	8.544 (217.0)	8.560 (217.4)	5.2 (7.8)
10 (250)	34243	—	34247	2¾ (70)	2⅞ (73)	10.680 (271.3)	10.696 (271.7)	8.1 (12)
12 (300)	34244	—	34248	3 (76)	3⅛ (79)	12.684 (322.2)	12.700 (322.6)	11 (17)
14 (350)	33946	—	33927	3½ (89)	3⅝ (92)	13.945 (354.2)	13.970 (354.8)	13 (20)
16 (400)	33947	—	33928	4 (102)	4⅛ (105)	15.909 (404.1)	15.925 (404.5)	17 (25)

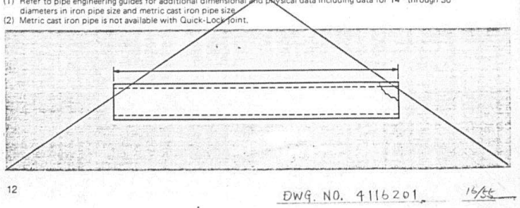


Note: Quick-Lock pipe in 8", 10", 12", 14" and 16" sizes is shipped with plain ends instead of the spigot ends shown above.

Plain End

Nom. Pipe Dia. in. (mm)	Iron Pipe Size(1) Commodity Code 2000-M (Epoxy)	7000 (Epoxy)	Approx. Weight lb/ft (kg/m)	Metric Cast Iron Size(1,2) Commodity Code 2000-M (Epoxy)	7000 (Epoxy)	Approx. Weight lb/ft (kg/m)
14 (350)	—	—	—	34189	34190	15 (22)
16 (400)	—	—	—	34156	34177	19 (28)
18 (450)	34146	34167	21 (32)	34157	34178	24 (35)
20 (500)	34147	34168	26 (39)	34158	34179	29 (43)
22 (550)	34148	34169	32 (47)	34159	34180	34 (51)
24 (600)	34149	34170	37 (56)	34160	34181	41 (60)
26 (650)	34150	34171	44 (65)	34161	34182	47 (70)
28 (700)	34151	34172	51 (75)	34162	34183	54 (81)
30 (750)	34152	34173	58 (86)	34163	34184	62 (03)
32 (800)	34153	34174	66 (98)	34164	34185	71 (105)
34 (850)	34154	34175	74 (110)	34165	34186	79 (118)
36 (900)	34155	34176	83 (123)	34166	34187	88 (132)

Note:
(1) Refer to pipe engineering guides for additional dimensional and physical data including data for 14" through 36" diameters in iron pipe size and metric cast iron pipe size.
(2) Metric cast iron pipe is not available with Quick-Lock joint.



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~~Table 2~~
Pipe Dimensions and Second Moment of Areas

Nominal Diameter in.	mm	Ameron Commodity Code	Diameter Inside in.	Inside mm	Outside in.	Outside mm	Total Wall Minimum Thickness in.	mm	Average Sectional Area in.²	cm²	Beam Second Moment of Area(2) in.⁴	million mm⁴
2	50	34002	2.09	53.1	2.37(1)	60.3	0.140	3.56	1.13	7.3	.59	.25
3	80	34003	3.22	81.8	3.50(1)	88.9(1)	0.140	3.56	1.70	11.0	1.98	.83
4	100	34004	4.14	105.2	4.50(1)	114.3(1)	0.180	4.57	2.73	17.6	5.50	2.29
6	150	34005	6.26	159.0	6.64(1)	168.6(1)	0.188	4.77	4.23	27.3	19.0	7.92
8	200	34242	8.22	208.8	8.70(1)	221.0(1)	0.241	6.12	7.01	45.2	55.7	23.2
10	250	34243	10.35	262.9	10.95(1)	278.0(1)	0.298	7.57	10.8	69.8	139.	57.7
12	300	34244	12.35	313.7	13.05(1)	331.5(1)	0.351	8.92	15.1	97.4	278.	115.
Iron Pipe Size (IPS)												
14	350	33946	13.29	337.6	14.04	356.6	0.376	9.55	17.4	112.	372.	156.
16	400	33947	15.19	385.8	16.04	407.5	0.428	10.87	22.5	145.	634.	264.
18	450	34146	17.08	433.8	18.04	458.1	0.478	12.15	28.1	182.	1010.	420.
20	500	34147	18.98	482.1	20.04	509.0	0.529	13.44	34.5	223.	1530.	638.
22	550	34148	20.88	530.3	22.04	559.8	0.580	14.74	41.5	268.	2240.	933.
24	600	34149	22.78	578.9	24.05	610.9	0.631	16.04	49.1	317.	3170.	1320.
26	650	34150	24.68	626.9	26.04	661.5	0.682	17.32	57.4	370.	4360.	1810.
28	700	34151	26.57	674.9	28.04	712.2	0.733	18.61	66.3	428.	5850.	2440.
30	750	34152	28.47	723.1	30.04	762.9	0.784	19.91	75.8	489.	7700.	3210.
32	800	34153	30.37	771.4	32.04	813.8	0.835	21.20	86.0	555.	9960.	4150.
34	850	34154	32.27	819.7	34.04	864.7	0.886	22.50	96.8	625.	12700.	5280.
36	900	34155	34.17	867.9	36.04	915.5	0.937	23.79	106.	681.	15900.	6630.
Metric Cast Iron Size												
14	350	34189	14.12	358.6	14.92	379.0	0.399	10.13	19.5	126.	474.	197.
16	400	34156	16.03	407.2	16.93	430.0	0.450	11.43	24.9	161.	784.	326.
18	450	34157	17.94	455.6	18.94	481.0	0.501	12.73	30.9	200.	1230.	510.
20	500	34158	19.83	504.9	20.99	533.0	0.553	14.05	37.7	243.	1840.	767.
22	550	34159	21.78	553.3	22.99	584.0	0.604	15.35	45.0	290.	2650.	1100.
24	600	34160	23.73	602.7	25.04	636.0	0.656	16.66	53.1	343.	3730.	1550.
26	650	34161	25.63	651.1	27.05	687.1	0.708	17.97	61.8	399.	5070.	2110.
28	700	34162	27.57	700.4	29.09	739.0	0.760	19.30	71.2	460.	6780.	2820.
30	750	34163	29.52	749.8	31.14	791.0	0.812	20.62	81.4	525.	8900.	3700.
32	800	34164	31.46	799.1	33.19	843.0	0.864	21.95	92.1	594.	11500.	4770.
34	850	34165	33.37	847.5	35.20	894.0	0.915	23.24	103.	667.	14500.	6030.
36	900	34166	35.31	896.9	37.25	946.1	0.967	24.57	115.	745.	18100.	7560.

Notes:
(1) Outside diameters approximate those for iron pipe size, ISO International Standard 559-1977 and for cast iron pipes, ISO Recommendation R13-1965 as follows:

Diameter	2	3	4	6	8	10	12
2000-M	60.3	88.9	114.3	168.6	221.0	278.0	331.5
ISO 559	60.3	88.9	114.3	168.3	219.1	273	323.9
ISO R13	—	98	118	170	222	274	326

(2) Values are for composite moment of area of structural wall and liner cross-section in terms of the structural wall. Beam second moment of area is also known as beam moment of inertia.

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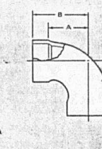
Filament-Wound Quick-Lock Fittings

Bondstrand filament-wound fittings are made using continuous glass fiber and thermosetting resin to form a strong, resilient fitting body. A reinforced resin layer completely and continuously covers the bore surface of lined fittings, providing extra corrosion and abrasion resistance.

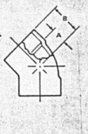
Elbow 90 Degree Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150° (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to End B in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34069	34100	34198	3 (76)	4 13/16 (122)	1 13/16 (46)	1.1 (0.5)
3 (80)	34070	—	34199	4 1/2 (114)	6 5/16 (160)	1 13/16 (46)	2.4 (1.1)
4 (100)	34071	—	34200	6 (152)	7 13/16 (198)	1 13/16 (46)	3.5 (1.6)
6 (150)	34072	—	34201	9 (229)	11 1/4 (286)	2 1/4 (57)	7.9 (3.6)
8 (200)	34073	—	34202	12 (305)	14 1/2 (368)	2 1/2 (64)	15 (6.8)
10 (250)	34074	—	34203	15 (381)	17 3/4 (451)	2 3/4 (70)	25 (11)
12 (300)	34075	—	34204	18 (457)	21 (533)	3 (76)	41 (18)
14 (350)	34358	—	34376	14 1/8 (359)	17 5/8 (448)	3 1/2 (89)	37 (26)
16 (400)	34359	—	34377	15 5/8 (397)	19 5/8 (498)	4 (108)	68 (31)



Elbow 45 Degree Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to End B in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34009	34101	34205	1 3/8 (35)	3 3/16 (81)	1 13/16 (46)	0.9 (0.4)
3 (80)	34010	—	34206	2 (51)	3 13/16 (97)	1 13/16 (46)	1.7 (0.8)
4 (100)	34011	—	34207	2 1/2 (64)	4 5/16 (110)	1 13/16 (46)	2.5 (1.1)
6 (150)	34012	—	34208	3 3/4 (95)	6 (152)	2 1/4 (57)	5.2 (2.4)
8 (200)	34013	—	34209	5 (127)	7 1/2 (191)	2 1/2 (64)	9.3 (4.2)
10 (250)	34014	—	34210	6 1/4 (159)	9 (229)	2 3/4 (70)	16 (7.3)
12 (300)	34015	—	34211	7 1/2 (191)	10 1/2 (267)	3 (76)	26 (11)
14 (350)	34360	—	34378	4 3/4 (120)	8 1/4 (210)	3 1/2 (89)	38 (17)
16 (400)	34361	—	34379	5 3/8 (136)	9 3/8 (238)	4 (102)	45 (20)



Elbow 22.5 Degree (Special Angle) Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to Pipe Stop A' in. (mm)	Center to End B in. (mm)	Center to End B' in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34112	34105	34212	1 (26)	1/2 (12)	2 7/8 (72)	2 1/8 (54)	1 13/16 (46)	0.7 (0.3)
3 (80)	34113	—	34213	1 1/4 (30)	3/4 (18)	3 (78)	2 1/2 (64)	1 13/16 (46)	1.3 (0.6)
4 (100)	34114	—	34214	3/4 (18)	—	2 1/2 (64)	—	1 13/16 (46)	3.3 (1.5)
6 (150)	34115	—	34215	1 1/8 (28)	—	3 3/8 (86)	—	2 1/4 (57)	3.9 (1.8)
8 (200)	34116	—	34216	2 1/8 (54)	—	4 5/8 (117)	—	2 1/2 (64)	12 (5.4)
10 (250)	34117	—	34217	2 5/8 (67)	—	5 3/8 (137)	—	2 3/4 (70)	19 (8.6)
12 (300)	34118	—	34218	3 (76)	—	6 (152)	—	3 (76)	29 (13)

Note: Special angle elbows are made to order and can be supplied to any specified angle from about 15 degrees to 85 degrees.

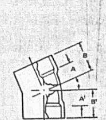


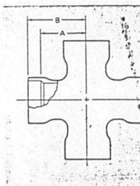
Table 3
Rated Pressures, Volumes and Weights of Pipe

Nominal Diameter in.	Nominal Diameter mm	Rated Internal Operating Pressure[1] at 150°F (66°C) psi	bar	Rated External Pressure[2] at 150°F (66°C) psi	bar	Fluid Volume gal/ft	m³/m	Shipping Weight lb/ft	kg/m
2	50	550	38	610	42.	0.18	0.0022	0.8	1.2
3	80	450	31	170	12.	0.42	0.0052	1.2	1.9
4	100	450	31	190	13.	0.70	0.0087	2.0	3.0
6	150	300	21	63	4.3	1.60	0.0199	3.1	4.6
8	200	300	21	63	4.3	2.76	0.0342	5.2	7.8
10	250	300	21	63	4.3	4.37	0.0542	8.1	12.
12	300	300	21	63	4.3	6.23	0.0772	11.	17.
Iron Pipe Size (IPS)									
14	350	300	21	63	4.3	7.21	0.0894	13.	20.
16	400	300	21	63	4.3	9.42	0.117	17.	25.
18	450	300	21	63	4.3	11.9	0.148	21.	32.
20	500	300	21	63	4.3	14.7	0.182	26.	39.
22	550	300	21	63	4.3	17.8	0.221	32.	47.
24	600	300	21	63	4.3	21.2	0.263	37.	56.
26	650	300	21	63	4.3	24.9	0.308	44.	65.
28	700	300	21	63	4.3	28.8	0.358	51.	75.
30	750	300	21	63	4.3	33.1	0.410	58.	86.
32	800	300	21	63	4.3	37.7	0.467	66.	98.
34	850	300	21	63	4.3	42.5	0.527	74.	110.
36	900	300	21	63	4.3	47.7	0.591	83.	123.
Metric Cast Iron Pipe Size									
14	350	300	21	63	4.3	8.14	0.101	15.	22.
16	400	300	21	63	4.3	10.5	0.130	19.	28.
18	450	300	21	63	4.3	13.1	0.163	24.	35.
20	500	300	21	63	4.3	16.1	0.200	29.	43.
22	550	300	21	63	4.3	19.4	0.240	34.	51.
24	600	300	21	63	4.3	23.0	0.285	41.	60.
26	650	300	21	63	4.3	26.8	0.333	47.	70.
28	700	300	21	63	4.3	31.0	0.385	54.	81.
30	750	300	21	63	4.3	35.6	0.441	62.	93.
32	800	300	21	63	4.3	40.4	0.501	71.	105.
34	850	300	21	63	4.3	45.5	0.564	79.	118.
36	900	300	21	63	4.3	50.9	0.631	88.	132.

Notes:
(1) System internal operating pressure may be limited by mechanical joints, fittings or anchoring requirements to values below the rating of the pipe itself.
(2) Pipe design resists collapse due to combined internal suction head and external fluid pressure. For example, a 63-psi (4.3-bar) external pressure rating allows for 120 ft (37 m) of water plus a 75 percent vacuum (suction head) with a safety factor of 2 to minimum ultimate collapse pressure.

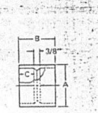
Cross Filament-Wound Quick-Lock

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to End B in. (mm)	Socket Depth in (mm)	Rated Hydrostatic Pressure at 150°F (66°C) psi (bar)	Approx. Weight lbs (kg)
2 (50)	34041	34104	34334	2 1/2 (64)	4 5/16 (110)	1 13/16 (46)	150 (10)	2.8 (1.3)
3 (80)	34042	—	34335	3 3/8 (86)	5 3/16 (132)	1 13/16 (46)	150 (10)	5.5 (2.5)
4 (100)	34043	—	34336	4 1/8 (105)	5 15/16 (151)	1 13/16 (46)	150 (10)	7.0 (3.2)
6 (150)	34044	—	34337	5 5/8 (143)	7 7/8 (200)	2 1/4 (57)	150 (10)	13 (5.9)
8 (200)	34045	—	34338	7 (178)	9 1/2 (241)	2 1/2 (64)	100 (6.8)	23 (10)
10 (250)	34046	—	34339	8 1/2 (216)	11 1/4 (286)	2 3/4 (70)	100 (6.8)	37 (16)
12 (300)	34047	—	34340	10 (254)	13 (330)	3 (76)	100 (6.8)	61 (27)
14 (350)	34369	—	34390	10 1/2 (267)	14 (356)	3 1/2 (89)		69 (31)
16 (400)	34370	—	34391	11 1/2 (292)	15 1/2 (394)	4 (102)		103 (47)



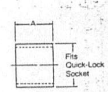
Coupling Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Outside Dia. A in. (mm)	Overall Length B in. (mm)	Socket Depth C in. (mm)	Approx. Weight lbs (kg)
2 (50)	34048	34098	34251	2 13/16 (71)	4 (102)	1 13/16 (46)	0.6 (0.3)
3 (80)	34049	—	34252	3 15/16 (100)	4 (102)	1 13/16 (46)	0.9 (0.4)
4 (100)	34050	—	34253	5 1/16 (129)	4 (102)	1 13/16 (46)	1.4 (0.6)
6 (150)	34051	—	34254	7 3/16 (183)	4 7/8 (124)	2 1/4 (57)	2.4 (1.1)
8 (200)	34052	—	34255	9 1/4 (235)	5 3/8 (137)	2 1/2 (64)	3.8 (1.7)
10 (250)	34053	—	34256	11 3/8 (289)	5 7/8 (149)	2 3/4 (70)	5.2 (2.4)
12 (300)	34054	—	34257	13 3/8 (340)	6 3/8 (162)	3 (76)	7.0 (3.2)
14 (350)	34363	—	34382	14 15/16 (398)	7 3/4 (197)	3 1/2 (89)	12 (5.4)
16 (400)	34319	—	34383	16 15/16 (430)	8 3/4 (222)	4 (102)	14 (6.4)



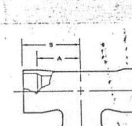
Nipple Filament-Wound
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Nipple Length A in. (mm)	Approx. Weight lbs (kg)
2 (50)	34055	34099	34258	3 3/4 (95)	0.2 (0.1)
3 (80)	34056	—	34259	3 3/4 (95)	0.3 (0.1)
4 (100)	34057	—	34260	3 3/4 (95)	0.5 (0.2)
6 (150)	34058	—	34261	4 5/8 (117)	0.9 (0.4)
8 (200)	34059	—	34262	5 1/8 (130)	1.4 (0.6)
10 (250)	34060	—	34263	5 5/8 (143)	1.9 (0.9)
12 (300)	34061	—	34264	6 1/8 (156)	2.4 (1.1)
14 (350)	34364	—	34384	7 1/4 (184)	6.7 (3.1)
16 (400)	34322	—	34385	8 1/4 (260)	9.7 (4.4)



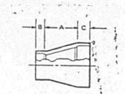
Tee Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop A in. (mm)	Center to End B in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34016	34102	34219	2 1/2 (64)	4 5/16 (110)	1 13/16 (46)	2.1 (1.0)
3 (80)	34017	—	34220	3 3/8 (86)	5 3/16 (132)	1 13/16 (46)	4.1 (1.9)
4 (100)	34018	—	34221	4 1/8 (105)	5 15/16 (151)	1 13/16 (46)	5.0 (2.3)
6 (150)	34019	—	34222	5 5/8 (143)	7 7/8 (200)	2 1/4 (57)	11 (5.0)
8 (200)	34020	—	34223	7 (178)	9 1/2 (241)	2 1/2 (64)	18 (8.2)
10 (250)	34021	—	34224	8 1/2 (216)	11 1/4 (286)	2 3/4 (70)	32 (14)
12 (300)	34022	—	34225	10 (254)	13 (330)	3 (76)	46 (20)
14 (350)	34362	—	34380	10 1/2 (267)	14 (356)	3 1/2 (88)	65 (29)
16 (400)	34320	—	34381	11 1/2 (292)	15 1/2 (394)	4 (102)	97 (44)



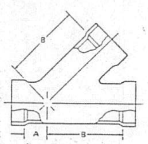
Reducer Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	7000 (Epoxy)	Pipe Stop to Pipe Stop A in. (mm)	Socket Depth B in. (mm)	Socket Depth C in. (mm)	Approx. Weight lbs (kg)
3 × 2 (80 × 50)	34023	34226	2 1/8 (54)	1 13/16 (46)	1 13/16 (46)	1.4 (0.6)
4 × 2 (100 × 50)	34024	34227	3 (76)	1 13/16 (46)	1 13/16 (46)	2.1 (1.0)
4 × 3 (100 × 80)	34025	34228	2 7/8 (73)	1 13/16 (46)	1 13/16 (46)	2.2 (1.0)
6 × 3 (150 × 80)	34026	34229	3 13/16 (97)	1 13/16 (46)	2 1/4 (57)	3.9 (1.8)
6 × 4 (150 × 100)	34027	34230	3 11/16 (94)	1 13/16 (46)	2 1/4 (57)	3.5 (1.6)
8 × 4 (200 × 100)	34028	34231	5 7/16 (138)	1 13/16 (46)	2 1/2 (64)	7.1 (3.2)
8 × 6 (200 × 150)	34029	34232	3 7/8 (98)	2 1/4 (57)	2 1/2 (64)	6.6 (3.0)
10 × 6 (250 × 150)	34030	34233	4 5/8 (117)	2 1/4 (57)	2 3/4 (70)	8.4 (3.8)
10 × 8 (250 × 200)	34031	34234	4 1/8 (105)	2 1/2 (64)	2 3/4 (70)	7.6 (3.4)
12 × 8 (300 × 200)	34032	34235	5 7/8 (149)	2 1/2 (64)	3 (76)	14 (6.4)
12 × 10 (300 × 250)	34033	34236	5 3/8 (137)	2 3/4 (70)	3 (76)	13 (5.9)
14 × 10 (350 × 250)	34372	34392	16 5/8 (422)	2 3/4 (70)	3 1/2 (89)	36 (16)
14 × 12 (350 × 300)	34373	34393	16 5/8 (422)	3 (76)	3 1/2 (89)	37 (17)
16 × 12 (400 × 300)	34374	34394	18 5/8 (473)	3 (76)	4 (102)	54 (24)
16 × 14 (400 × 350)	34375	34395	18 7/8 (479)	3 1/2 (89)	4 (102)	57 (26)



Lateral 45 Degree Filament-Wound Quick-Lock
Rated Hydrostatic Pressure at 150°F (66°C) – 150 psi (10 bar)

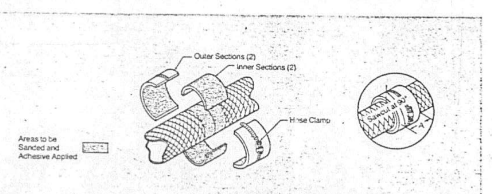
Nom. Pipe Dia. in. (mm)	Commodity Code 2000-M (Epoxy)	5000-M (Vinylester)	7000 (Epoxy)	Center to Pipe Stop Short A in. (mm)	Center to Pipe Stop Long B in. (mm)	Socket Depth in (mm)	Approx. Weight lbs (kg)
2 (50)	34034	34103	34327	2 1/2 (64)	8 (203)	1 13/16 (46)	3.6 (1.6)
3 (80)	34035	—	34328	3 (76)	10 (254)	1 13/16 (46)	6.6 (3.0)
4 (100)	34036	—	34329	3 (76)	12 (305)	1 13/16 (46)	8.7 (3.9)
6 (150)	34037	—	34330	3 1/2 (89)	14 1/2 (368)	2 1/4 (57)	15 (6.8)
8 (200)	34038	—	34331	4 1/2 (114)	17 1/2 (445)	2 1/2 (64)	27 (12)
10 (250)	34039	—	34332	5 (127)	20 1/2 (521)	2 3/4 (70)	47 (21)
12 (300)	34040	—	34333	5 1/2 (140)	24 1/2 (622)	3 (76)	67 (30)

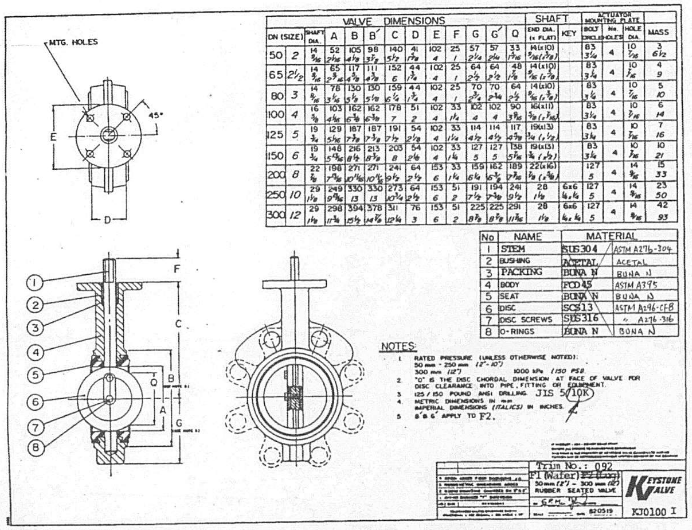


BUTT JOINT COUPLING KIT

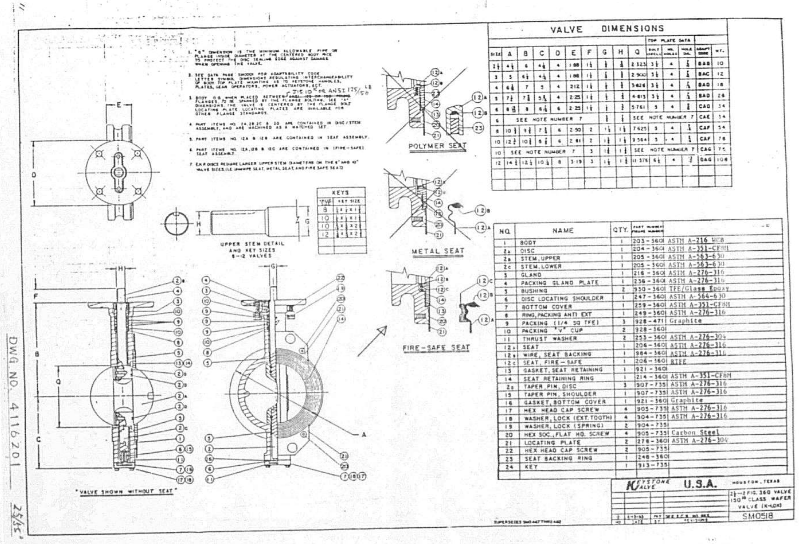
Nominal Pipe Dia. in. (mm)	Commodity Code	Coupling Length A in. (mm)	Rated Hydrostatic Pressure at 150°F (66°C) psi (bar)	Number of 6 oz. Adhesive Kits Required per Assembly
2 (50)	36932	4 (102)	150 (10)	1
3 (80)	36933	4 (102)	150 (10)	1
4 (100)	36934	4 (102)	150 (10)	2
6 (150)	36944	4 7/8 (124)	150 (10)	2
8 (200)	34049	5 3/8 (137)	125 (8.6)	3
10 (250)	34095	5 7/8 (149)	125 (8.6)	4
12 (300)	34096	6 3/8 (162)	100 (6.8)	4

Note:
Hose clamp is removed after thermosetting.
Reduce rated pressure 50 percent if RP-105 adhesive is substituted for RP-34.

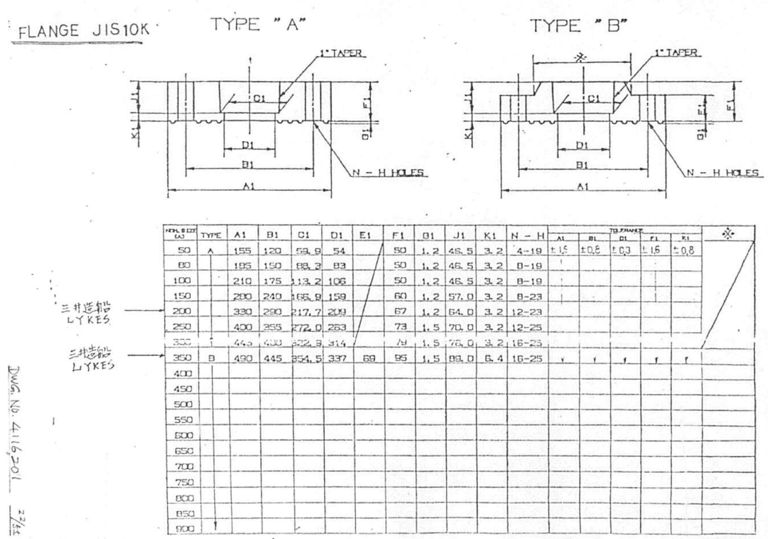




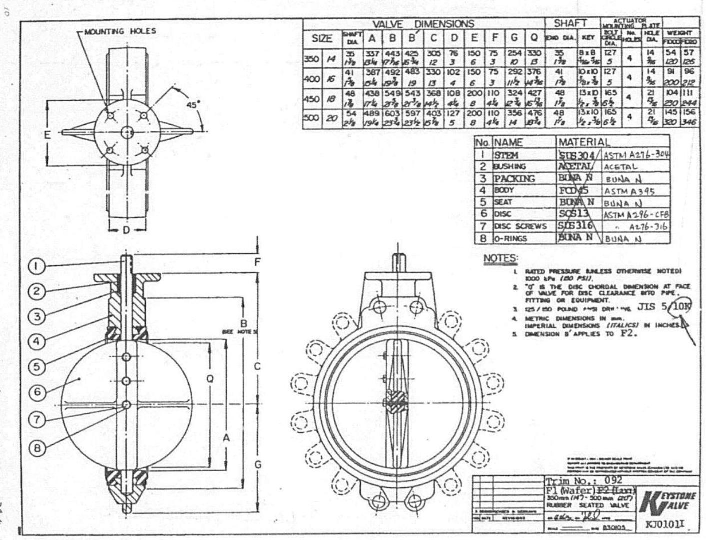
VALVE DIMENSIONS
MTG. HOLES
NOTES:
RATED PRESSURE (UNLESS OTHERWISE NOTED):
Trim No.: 092
RUBBER SEATED VALVE
KEYSTONE VALVE
KJ0100 I
DWG NO. 4116201



VALVE DIMENSIONS
POLYMER SEAT
METAL SEAT
FIRE-SAFE SEAT
VALVE SHOWN WITHOUT SEAT
KEYSTONE VALVE U.S.A.
SM0518
DWG NO. 4116201

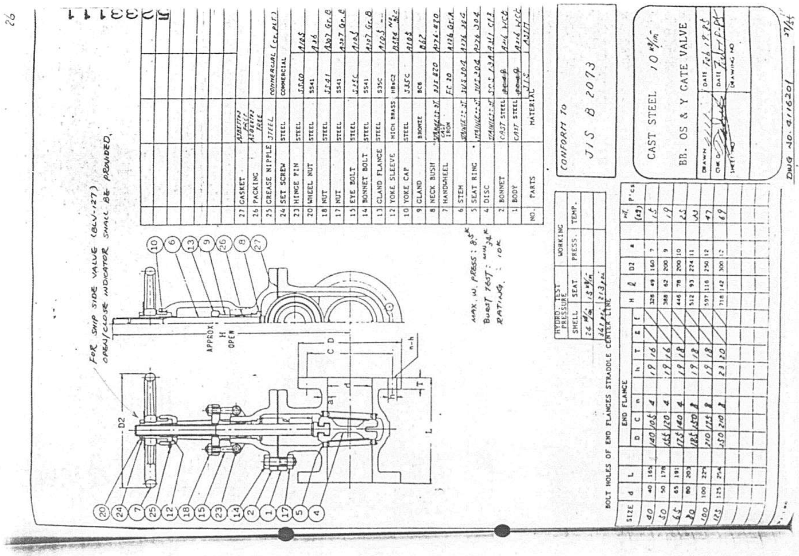


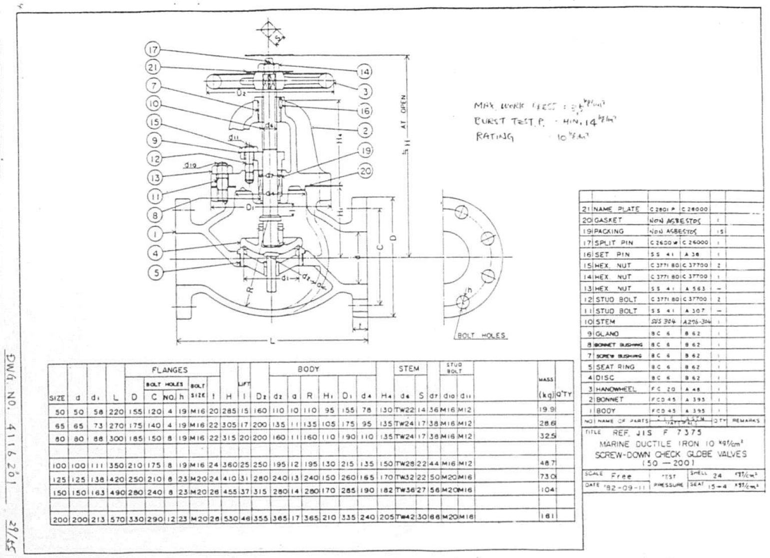
FLANGE JIS10K
TYPE "A"
TYPE "B"
1° TAPER
N - H HOLES
三井造船 LYKES
DWG NO. 4116201

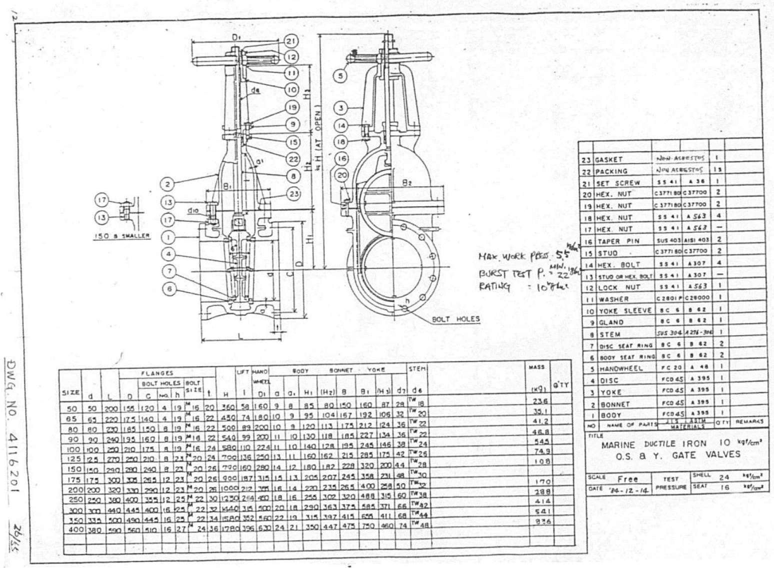


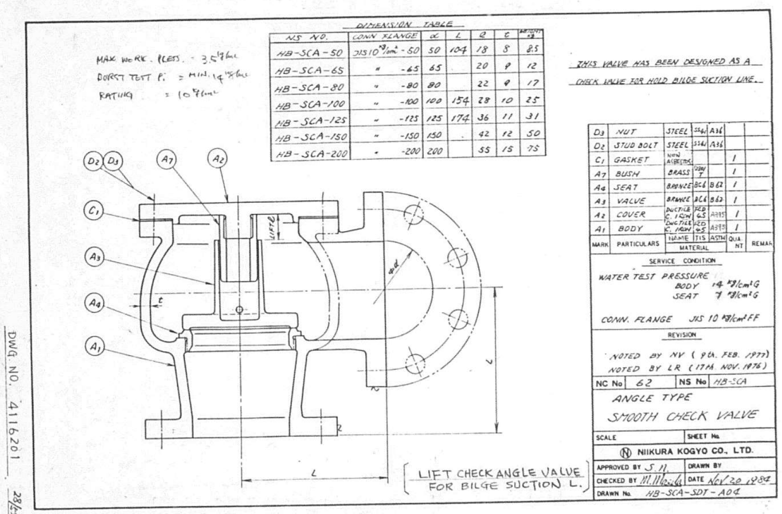
MOUNTING HOLES
VALVE DIMENSIONS
NOTES:
Trim No.: 092
RUBBER SEATED VALVE
KEYSTONE VALVE
KJ0101 II
DWG NO. 4116201

1582

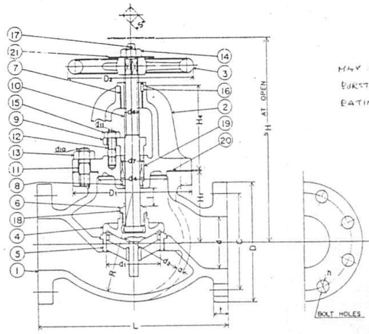

FOR SHIP SIDE VALVE (BLV-127) OPEN/CLOSE INDICATOR SHALL BE PROVIDED.
MAX. W. PRESS : 8.5K
BURST TEST : MIN. 14K
RATING : 10K
CONFORM TO JIS B 2073
CAST STEEL 10 K/cm²
BR. OS & Y GATE VALVE
DWG NO. 4116201


MAX WORK PRESS : 8.5 K/cm²
BURST TEST P. : MIN. 14 K/cm²
RATING : 10 K/cm²
BOLT HOLES
REF. JIS F 7375
MARINE DUCTILE IRON 10 K/cm² SCREW-DOWN CHECK GLOBE VALVES (50 — 200)


150 & SMALLER
MAX. WORK PRESS : 5.5 K/cm²
BURST TEST P. : MIN. 22 K/cm²
RATING : 10 K/cm²
BOLT HOLES
MARINE DUCTILE IRON 10 K/cm² O.S. & Y. GATE VALVES
DWG. NO. 4116201


MAX. WORK. PRESS. : 3.5 K/cm²
BURST TEST P. : MIN. 14 K/cm²
RATING : 10 K/cm²
DIMENSION TABLE
THIS VALVE HAS BEEN DESIGNED AS A CHECK VALVE FOR HOLD BILGE SUCTION LINE.
WATER TEST PRESSURE BODY 14 K/cm²G SEAT 7 K/cm²G
CONN. FLANGE JIS 10 K/cm² FF
ANGLE TYPE SMOOTH CHECK VALVE
NIIKURA KOGYO CO., LTD.
LIFT CHECK ANGLE VALVE FOR BILGE SUCTION L.
DWG NO. 4116201

1583



MAX WORK PRESS. : 8.5 kg/cm²
BURST TEST P. : 34 kg/cm²
RATING : 10 kg/cm²

SIZE	d	d1	L	D	C	NO	h	BOLT SIZE	t	H	l	D2	d2	a	R	H1	D1	d4	H4	d6	S	d7	d10	d11	MASS (kg)	Q'TY
				FLANGES	BOLT HOLES						LIFT		BODY							STEM			STUD BOLT			
50	50	58	220	155	120	4	19	M16	20	285	17	160	110	10	110	95	155	78	130	TW22	14	36	M16	M12	19.9	
65	65	73	270	175	140	4	19	M16	22	310	22	200	135	11	135	105	175	95	135	TW24	17	38	M16	M12	28.7	
80	30	88	300	185	150	8	19	M16	22	320	27	200	160	11	160	110	190	110	135	TW24	17	38	M16	M12	32.4	
100	100	111	350	210	175	8	19	M16	24	370	33	250	195	12	195	130	215	135	150	TW28	22	44	M16	M12	48.7	
125	125	138	420	250	210	8	23	M20	24	420	42	280	240	13	240	150	260	165	170	TW32	22	50	M20	M16	73.1	
150	150	163	490	280	240	8	23	M20	26	470	50	315	280	14	280	170	285	190	182	TW36	27	56	M20	M16	104	
200	200	213	570	330	290	12	23	M20	26	555	67	355	335	17	365	210	335	240	205	TW42	30	66	M20	M16	162	

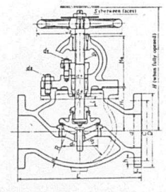
NO	NAME OF PARTS	JIS	ASTM	Q'TY	REMARKS
21	NAME PLATE	C 2801 P	C 28000		
20	GASKET	NON ASBESTOS		1	
19	PACKING	NON ASBESTOS		1S	
18	LOCK WASHER	C 2600 P	C 26000	1	
17	SPLIT PIN	C 2600 W	C 26000	1	
16	SET PIN	SS 41	A 36	1	
15	HEX. NUT	C 3771 BD	C 37700	2	
14	HEX. NUT	C 3771 BD	C 37700	1	
13	HEX. NUT	SS 41	A 563	–	
12	STUD BOLT	C 3771 BD	C 37700	2	
11	STUD BOLT	SS 41	A 307	–	
10	STEM	SUS 304	A276-304	1	
9	GLAND	BC 6	B 62	1	
8	BONNET BUSHING	BC 6	B 62	1	
7	SCREW BUSHING	BC 6	B 62	1	
6	DISC NUT	BC 6	B 62	1	
5	SEAT RING	BC 6	B 62	1	
4	DISC	BC 6	B 62	1	
3	HANDWHEEL	FC 20	A 48	1	
2	BONNET	FCD 45	A 395	1	
1	BODY	FCD 45	A 395	1	

TITLE REF. JIS F 7307
MARINE DUCTILE IRON 10 kgf/cm²
GLOBE VALVES (50 – 200)

SCALE Free | DATE '82-09-11 | TEST PRESSURE SHELL 24 kgf/cm² SEAT 15 kgf/cm²

DWG NO 4116201 31/35

F 7319-1982



MAX W. PRESS : 8.5 kg/cm²
BURST TEST P. : MIN. 34 kg/cm²
RATING : 10 kg/cm²

Bolt holes of flanges shall standdle body center lines.

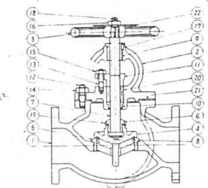
Unit: mm

Nominal dia.	d	d1	L	D	P.C.C. dia. C	No.	h	Nominal dia. of bolt	t	H	Lift l	Handwheel D2	d2	a	R	H1	D1	d4	Height of bonnet H4	Stem Threads d6	S	Stuffing box d7	Threads d8	d9	Calculated mass (kg)
50	50	58	220	155	120	4	19	M16	16	270	17	160	110	8	110	90	155	78	120	TW22	14	36	M16	M12	17.9
65	65	73	270	175	140	4	19	M16	18	300	22	200	135	9	135	100	175	95	128	TW24	17	38	M16	M12	26.0
80	80	88	300	185	150	8	19	M16	18	310	27	200	160	9	160	105	190	110	128	TW24	17	38	M16	M12	29.8
100	100	111	350	210	175	8	19	M16	18	355	33	250	195	11	195	123	215	135	142	TW28	22	44	M16	M12	44.7
125	125	138	420	250	210	8	23	M20	20	415	42	280	240	12	240	150	260	165	165	TW32	22	50	M20	M16	70.3
150	150	163	490	280	240	8	23	M20	22	470	50	315	280	13	280	170	285	190	185	TW36	27	56	M20	M16	96.4
200	200	213	570	330	290	12	23	M20	22	565	67	355	365	15	365	210	335	240	218	TW42	30	66	M20	M16	159

Remarks: 1. The flanges shall conform to JIS B 2212.
2. The threads d_6 shall conform to JIS B 0222 and d_8 and d_9 to JIS B 0205.
3. The name plate shall be specified by purchaser as required.

Fig. 1

DWG NO 4116201 32/35

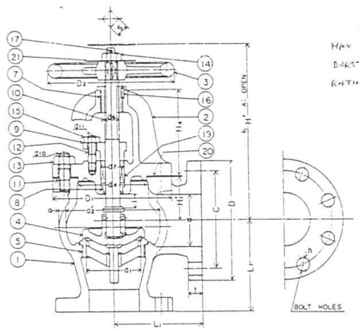


No.	Component	Material	No.	Component	Material
1	Body	JIS G 5101 - SC49 (ASTM A216, GRADE WCB)	14	Hexagon nut	JIS G 3101 - SS41 (ASTM A307 Gr.B)
2	Bonnet		15	Hexagon nut	JIS G3101-SS41 (ASTM A307 Gr B)
3	Handwheel	JIS G 5501 - FC20 (ASTM A126 GRADE A)	16	Hexagon nut	
4	Disc	JIS G 5121 - SCS2 (SCS1) (ASTM A 151-CF8)	17	Lock pin	JIS G 3101 - SS41 (ASTM A307 Gr B)
5	Valve seat		18	Split pin	JIS H 3260 - C2600W
6	Packing bush	JIS G 4303 - SUS420J1 (ASTM A182 TYPE 420)	19	Disc lock washer	JIS G 4305 - SUS304 (ASTM A276 TYPE 304)
7	Stem	JIS G 4303 - SUS403 304 (ASTM A276 TYPE 304)	20	Packing	NON ASBESTOS
8	Washer for stem	JIS G 4404 - SKD1	21	Gasket	
9	Screwed bonnet bush	JIS H 3250 - C6782BD (ASTM B584 C86400)	22	Name plate	JIS H 3100 - C2801P
10	Packing bush	JIS G 4303 - SUS420J1 (ASTM A276 TYPE 420)	23	~~Disc guide~~	~~JIS G 4303 - SUS304 (ASTM A276 TYPE 304)~~
11	Packing gland	JIS H 5111 - BC6 (ASTM B62)	24	~~Disc~~	~~(ASTM A216, GRADE B)~~
12	Stud	JIS G 3101 - SS50 (ASTM A307 Gr B)	25	~~Valve seat~~	
13	Stud	JIS G 3101 - SS41 (ASTM A307 Gr B)	26	~~Bush~~	~~JIS G 4303 - SUS420J1 (ASTM A276 TYPE 420)~~

Remarks: 1. Letters in boldface show the materials specified in 4. (1).
2. The contact surfaces of stainless steel shall be provided with different hardness by heat treatment or else so as to prevent seizure.
3. The material for depositing to the disc and valve seat shall have performance equivalent or better than that of the material of Part No.5. For valves intended for use with sea water, the material for depositing shall be austenite stainless steel.

Fig. 2

The valves shall be tested as follows:
(a) Watertight inspection for valve seat: 15 kgf/cm² [1.47 MPa]
(b) Hydraulic inspection for body: 24 kgf/cm² [2.35 MPa]



MAX WORK PRESS : 3.5 kg/cm²
BURST TEST P. : MIN 14 kg/cm²
RATING : 10 kg/cm²

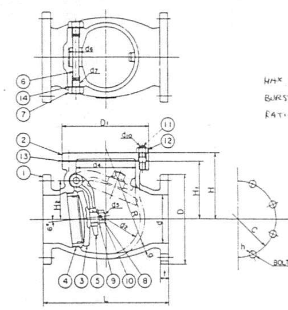
SIZE	d	d1	L1	D	C	NO	h	BOLT SIZE	t	H'	l	D2	d2'	a	H1'	D1	d4	H4	d6	S	d7	d10	d11	MASS (kg)	Q'TY
				FLANGES	BOLT HOLES						LIFT		BODY						STEM			STUD BOLT			
50	50	58	120	155	120	4	19	M16	20	255	15	160	105	10	65	155	78	130	TW22	14	36	M16	M12	18.2	
65	65	73	130	175	140	4	19	M16	22	260	17	200	130	11	62	175	95	135	TW24	17	38	M16	M12	25.3	
80	80	88	140	185	150	8	19	M16	22	270	20	200	150	11	65	190	110	135	TW24	17	38	M16	M12	27.5	
100	100	111	160	210	175	8	19	M16	24	305	25	250	185	12	75	215	135	150	TW28	22	44	M16	M12	40.8	
125	125	138	180	250	210	8	23	M20	24	350	31	280	225	13	90	260	165	170	TW32	22	50	M20	M16	60.8	
150	150	[illegible]	265	280	240	8	23	M20	26	390	37	315	265	14	105	285	130	182	TW36	27	36	M20	M16	81.2	
200	200	213	230	330	290	12	23	M20	26	450	48	355	340	17	130	335	240	205	TW42	30	66	M20	M16	124	

NO	NAME OF PARTS	JIS	ASTM	Q'TY	REMARKS
21	NAME PLATE	C 2801 P	C 28000		
20	GASKET	NON ASBESTOS		1	
19	PACKING	NON ASBESTOS		1S	
17	SPLIT PIN	C 2600 W	C 26000	1	
16	SET PIN	SS 41	A 36	1	
15	HEX. NUT	C 3771 BD	C 37700	2	
14	HEX. NUT	C 3771 BD	C 37700	1	
13	HEX. NUT	SS 41	A 563	–	
12	STUD BOLT	C 3771 BD	C 37700	2	
11	STUD BOLT	SS 41	A 307	–	
10	STEM	SUS 304	A276-304	1	
9	GLAND	BC 6	B 62	1	
8	BONNET BUSHING	BC 6	B 62	1	
7	SCREW BUSHING	BC 6	B 62	1	
5	SEAT RING	BC 6	B 62	1	
4	DISC	BC 6	B 62	1	
3	HANDWHEEL	FC 20	A 48	1	
2	BONNET	FCD 45	A 395	1	
1	BODY	FCD 45	A 395	1	

TITLE REF. JIS F 7376
MARINE DUCTILE IRON 10 kgf/cm²
SCREW-DOWN CHECK ANGLE VALVES
(50 – 200)

SCALE Free | DATE '82-09-11 | TEST PRESSURE SHELL 24 kgf/cm² SEAT 15–4 kgf/cm²

DWG NO. 4116201 30/35



MAX WORK PRESS : 8.5 kg/cm²
BURST TEST P. : MIN. 34 kg/cm²
RATING : 10 kg/cm²

※ MARK ARE MAKER STANDARD.

SIZE	d	L	D	C	NO	h	BOLT SIZE	t	H	d2	a	R	H1	D1	d4	H2	d6	d7	d8	d10	MASS (kg)	Q'TY
			FLANGES	BOLT HOLES						BODY								THREADS				
50	50	210	155	120	4	19	M16	20	109	90	10	135	90	150	75	50	9	M12 x 1.25	M10	M16	13.6	
65	65	240	175	140	4	19	M16	22	126	110	11	170	105	170	95	62	11	M16 x 1.5	M12	M16	19.6	
80	80	270	185	150	8	19	M16	22	136	130	11	190	115	185	110	70	12	M16 x 1.5	M12	M16	22.6	
100	100	300	210	175	8	19	M16	24	153	150	12	230	130	205	130	85	14	M20 x 1.5	M16	M16	30.9	
125	125	350	250	210	8	23	M20	24	180	190	13	280	155	250	160	102	17	M20 x 1.5	M20	M20	49.2	
150	150	400	280	240	8	23	M20	26	205	220	14	330	180	275	190	120	20	M24 x 2	M22	M20	54.9	
200	200	480	330	290	12	23	M20	26	242	280	17	420	215	330	240	155	24	M30 x 2	M24	M20	103	
※250	250	622	400	355	12	25	M22	30	309	370	19	400	280	420	315	190	28	M36 x 2	M30	M20	206	
※300	300	700	445	400	16	25	M22	32	363	450	20	450	330	455	380	234	30	M38 x 2	M36	M22	290	

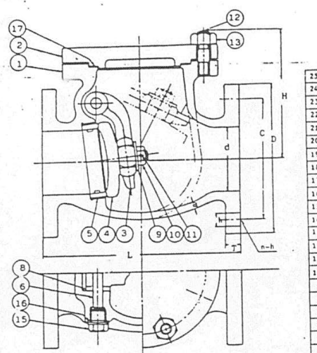
NO	NAME OF PARTS	JIS	ASTM	Q'TY	REMARKS
14	GASKET	NON ASBESTOS		2	
13	GASKET	NON ASBESTOS		1	
12	HEX. NUT	SS 41	A 563	–	
11	STUD	SS 41	A 307	–	
10	SPLIT PIN	C 2600 W	C 26000	1	
9	WASHER	C 2801 P	C 28000	1	
8	HEX. NUT	C 3771 BD	C 37700	1	
7	PLUG	C 3771 BD	C 37700	2	
6	HINGE PIN	SUS 304	A276-304	1	
5	ARM	BC 6	B 62	1	
4	SEAT RING	BC 6	B 62	1	
3	DISC	BC 6	B 62	1	
2	COVER	FCD 45	A 395	1	
1	BODY	FCD 45	A 395	1	

TITLE REF. JIS F 7373
MARINE DUCTILE IRON 10 kgf/cm²
SWING CHECK VALVES

SCALE Free | DATE '82-08-28 | TEST PRESSURE SHELL 24 kgf/cm² SEAT 15–4

DWG NO. 4116201 32/35

1584



NO.	PARTS	MATERIAL	JIS	ASTM
25				
24				
23				
22				
21				
20				
19				
18				
17	GASKET	ASBESTOS FREE		
16	GASKET	ASBESTOS FREE		
15	PLUG	STAINLESS STEEL	SUS 304	A276 304
14				
13	NUT	STEEL	SS41	A307 Gr. B
12	STUD	STEEL	SS41	A307 Gr. B
11	COTTER PIN	STAINLESS STEEL	COMMERCIAL	
10	NUT	STAINLESS STEEL	SUS 304	A276 304
9	WASHER	STAINLESS STEEL	SUS 304	A276 304
8	COLLAR	STAINLESS STEEL	SUS 304	A276 304
7				
6	PIN	STAINLESS STEEL	SUS 304	A276 304
5	SEAT RING	STAINLESS STEEL	SUS 304	A276 304
4	DISC	STAINLESS STEEL	SCS 13 A	A351 CF8
3	HINGE	STAINLESS STEEL	SCS 13 A	A351 CF8
2	CAP	CAST STEEL	~~SC 46~~	A216 WCB
1	BODY	CAST STEEL	~~SC 46~~	A216 WCB

MAX. WORK. PRESS : 8.5 kg/cm²
BURST TEST P. : MIN. 34 kg/cm²
RATING : 10 kg/cm²

SPECIFIDE PRESS. & TEMP.

FLUID

HYDRAULIC TEST PRESSURE

SHELL	24 kg/cm²	341 psi
SEAT	15 kg/cm²	213 psi

CONFORM TO JIS B 2074

BOLT HOLES OF END FLANGES STRADDLE CENTER LINE

SIZE	d	L	L1	FLANGE D	C	n		h	T			H	ℓ	D2	a		WT. (kg)	P'cs.
50	50	203	/	155	120	4	/	19	16	/	/	135	/	/	8		18	
65	65	216	/	175	140	4	/	19	18	/	/	147	/	/	9		22	
80	80	241	/	185	150	8	/	19	18	/	/	162	/	/	9		27	
100	100	292	/	210	175	8	/	19	18	/	/	185	/	/	11		43	

CAST STEEL 10 kg/cm²

SWING CHECK VALVE

DRAWN [signature] DATE Feb. 18. 85
CHK'D [signature] DATE Feb. 18. 85
SHEET NO. DRAWING NO.

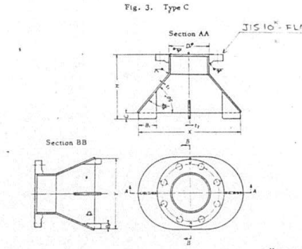
DWG. NO. 4116201 32/55

SUCTION BELLMOUTH

MATERIAL : STEEL PLATE (SS41)
(EQUIVALENT TO ASTM A36)
(HOT GALVANIZED EXCEPT FOR F.O. TANKS)

F 3020-1969

Fig. 3. Type C



Unit: mm

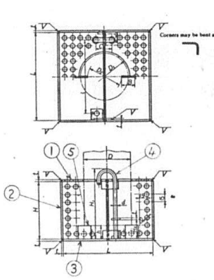
Nominal dia.	Body H	D_1	X	Y	C	t_1	Rib B_1	B_2	t_2	Ratio Suction area / Pipe area	Calculated weight (kg)
150	270	165.2	420	300	25	8	75	25	8	1.65	14.0
200	300	216.3	555	360	35	8	100	45	8	1.65	21.5
225	350	241.8	600	380	40	10	120	50	10	1.65	32.7
250	400	267.4	675	400	45	10	130	50	10	1.65	39.7
300	450	318.5	860	550	50	10	160	85	10	1.65	60.7
350	500	355.6	865	550	60	12.7	160	85	12.7	1.65	79.3
400	550	406.4	1000	600	70	12.7	160	85	12.7	1.65	99.5
450	600	457.2	1170	600	80	12.7	180	90	12.7	1.65	122
500	650	508.0	1240	750	90	12.7	180	90	12.7	1.65	152
550	700	558.8	1410	750	100	12.7	200	100	12.7	1.65	177

Remarks 1. Flange to JIS B 2212. Pipe flange to JIS B 2211 may be used if necessary.
2. Pipe may be welded directly to tapered part of the bellmouth when the flange is not used.

ROSE BOX
(HOT GALVANIZED)

F 7206-1980

Unit: mm



Unit: mm

Nominal dia.	Outside dia. of steel	D_1	D_2	d	L	l	C	H	H_1	H_2	h	t	B	Reference calculated mass (kg)
40	48.6	53	35	9	95	75	30	65	90	28	17	3.2	30	0.78
50	60.5	65	35	9	110	90	30	80	105	35	20	3.2	40	1.34
65	76.3	82	45	9	140	120	30	95	120	35	22	3.2	40	2.10
80	89.1	94	50	9	170	140	30	110	135	35	25	3.2	50	3.01
100	114.3	120	80	9	200	170	30	140	165	40	30	3.2	50	4.30
125	139.8	145	105	9	260	230	30	170	200	40	40	3.2	50	6.26
150	165.2	170	125	9	320	290	30	200	230	40	50	3.2	60	9.26
200	216.3	222	180	13	380	340	40	260	300	55	60	4.5	65	20.5
250	267.4	272	225	13	440	400	40	320	360	55	70	4.5	75	27.8
300	318.5	325	280	16	500	450	50	350	600	65	80	4.5	80	35.3

Remark: The area ratio of filtering holes shall be about 5 times the sectional area based on the nominal diameter for 200 mm or less, and about 3 times for 250 mm or more, after galvanized plating.

Fig. 1

No.	Component	Material
1	Strainer plate	JIS G 3101 – SS 41 (ASTM A36)
2	Strainer plate	
3	Bottom plate	
4	Locking bar	
5	Support piece	

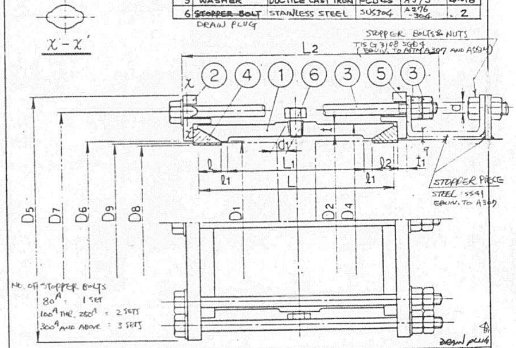
Remark: The galvanizing shall be carried out after welded fabrication of rose box.

Fig. 2

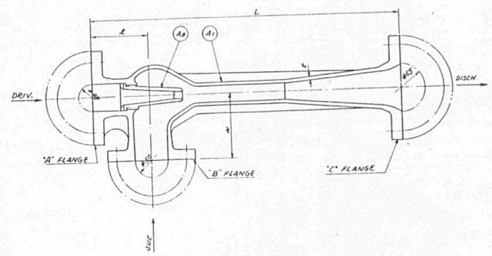
DRESSER TYPE
EXPANSION JOINT

MARK	NAME	MATERIAL	JIS	ASTM	NO.
1	SOCKET	DUCTILE CAST IRON	FCD45	A395	1
2	FLANGE	DO.	〃	〃	2
3	BOLT & NUT	MILD STEEL	SS41	A307 GR.B	4~16
4	PACKING	SYNTHETIC RUBBER	HYCAR OR NEOPRENE		2
5	WASHER	DUCTILE CAST IRON	FCD45	A395	4~16
6	~~STOPPER BOLT~~ DRAIN PLUG	STAINLESS STEEL	SUS304	A276-304	2

HOT GALV. → (3)



NOMINAL DIA. M/M	IN	OUT DIA OF PIPE (D9)	SOCKET D1	D2	D4	L	L1	ℓ	ℓ1	t	FLANGE D5	D6	D7	t1	BOLT NO	d	L2	PACKING D8	ℓ2	DRAIN PLUG NO	d1	WT kg
80	3	89.1	90.5	100.5	116.5	200	160	15	5	8	175.5	90.5	145.5	6	4	M16	280	88	20	2	P.T. 3/8	11
100	4	114.3	116.5	124	142	200	160	15	5	9	201	116.5	171	6	4	M16	280	113	20	2	P.T. 3/8	14
125	5	139.8	142.5	152	172	206	160	18	5	10	231	142.5	201	6	6	M16	280	138	25	2	P.T. 3/8	17
150	6	165.2	169.5	178	200	210	160	20	5	11	261	169.5	229	7	6	M16	280	163	27	2	P.T. 3/8	20
200	8	216.3	220.5	229	255	215	160	22.5	5	13	316	220.5	284	7	6	M16	290	213	30	2	P.T. 3/8	26
250	10	267.4	272	281	307	215	160	22.5	5	13	372	272	338	8	8	M16	290	264	30	2	P.T. 1/2	33
300	12	318.5	323	333	359	215	160	22.5	5	13	426	323	390	8	8	M16	290	314	30	2	P.T. 1/2	40
350	14	355.6	360	371	397	215	160	22.5	5	13	466	360	430	9	10	M16	290	350	30	2	P.T. 1/2	47
400	16	406.4	411	422	448	215	160	22.5	5	13	519	411	481	10	10	M16	290	400	30	2	P.T. 1/2	54
450	18	457.2	462	475	502	215	160	22.5	5	13	577	462	537	11	12	M16	300	450	32	2	P.T. 1/2	63
500	20	508.0	513	527	555	215	160	22.5	5	14	634	513	592	12	12	M16	300	500	32	2	P.T. 3/4	73
550	22	558.8	564	578	606	215	160	22.5	5	14	585	564	643	12	14	M16	300	550	32	2	P.T. 3/4	80
600	24	609.6	615	629	657	215	160	22.5	5	14	736	615	694	12	14	M16	300	600	32	2	P.T. 3/4	88
650	26	660.4	666	680	708	215	160	22.5	5	14	791	666	747	13	16	M16	300	650	32	2	P.T. 3/4	96
700	28	711.2	717	732	760	215	160	22.5	5	14	843	717	799	13	16	M16	300	700	32	2	P.T. 3/4	112



DIMENSION TABLE

NS. NO.	"A" FLANGE	"B" FLANGE	"C" FLANGE	L	ℓ	H	t	WEIGHT
~~BC-ER-50~~	JIS 10K - 40	JIS 10K - 50	JIS 10K - 65	480	105	100	5	13 kg
FC-ER-50H / 50L	"	"	"	480	105	100	7	13 kg

MARK	PARTICULARS	MATERIAL NAME	MATERIAL JIS	MATERIAL ASTM	QUANT	REMARKS
A0	NOZZLE	STL. STEEL	SUS 304	A276	1	
A1	BODY	DUCTILE CAST IRON	FCD 45	A395	1	

SERVICE CONDITION

DRIV. WATER PRESSURE	7 OR 5	kg/cm²
" " CAPACITY	25	m³/Hr
SUCTION HEAD	-5	M
DISCHARGE HEAD	28 OR 10	M
SUCTION CAPACITY	5	m³/Hr
WATER TEST PRESSURE	16	kg/cm²
CONN. FLANGE	JIS 10 kg/cm² - FF	

REVISION

NC No. 4 | NS No. ~~BC-ER-50~~ FCD-ER-50

WATER JET EDUCTOR

SCALE | SHEET No.

NIIKURA KOGYO CO., LTD.

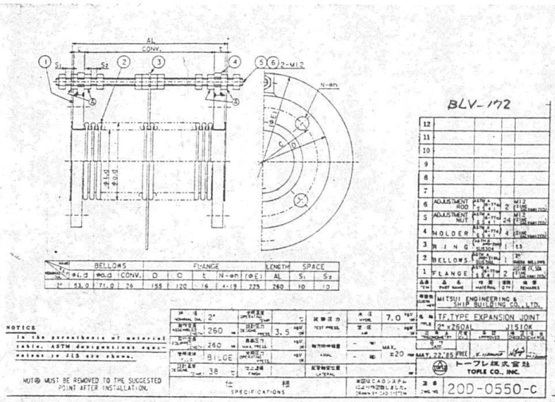
APPROVED BY I.N. | DRAWN BY

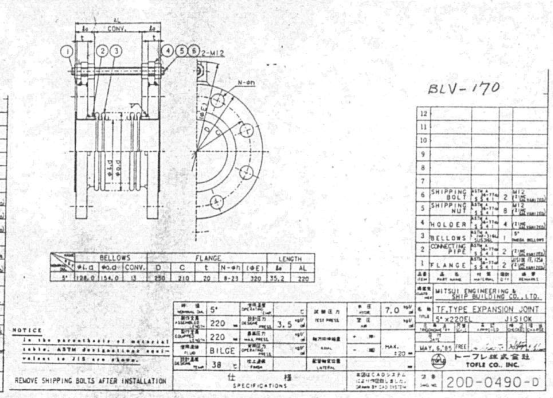
CHECKED BY M. Niikura | DATE Dec. 1. 1937

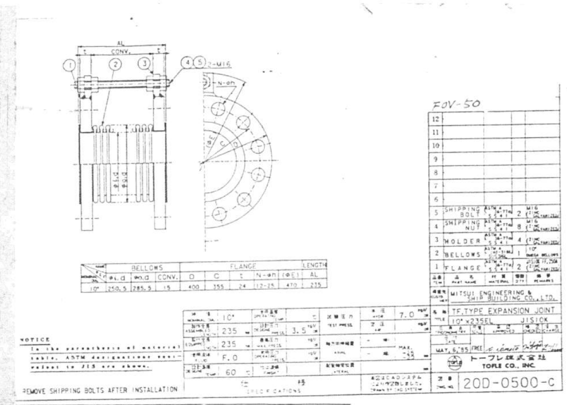
DRAWN No. BC/FC-ER-50A05

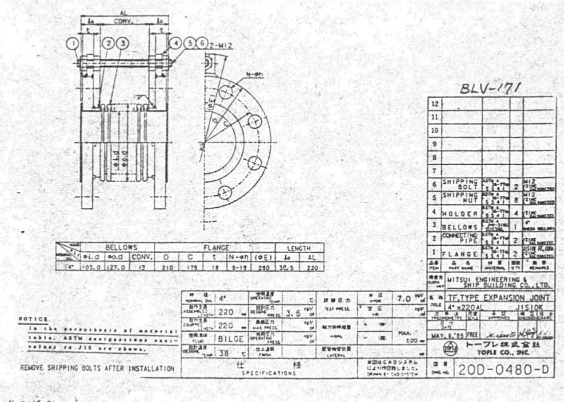
DWG NO. 4116201

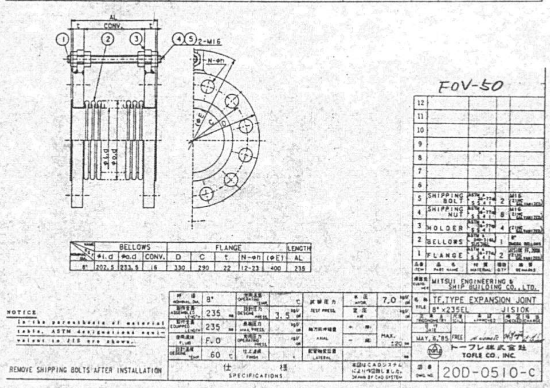
1586

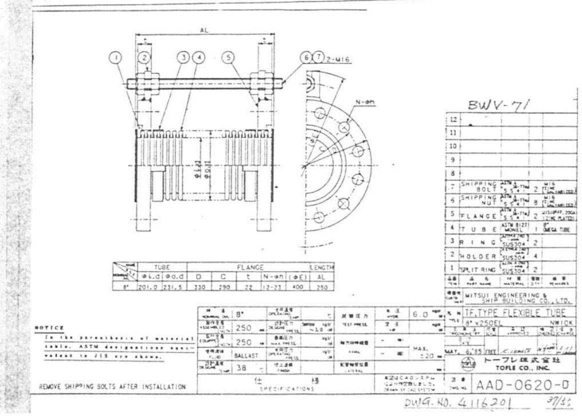

BLV-172
TF.TYPE EXPANSION JOINT
MITSUI ENGINEERING & SHIP BUILDING CO.,LTD.
TOFLE CO., INC.
NUT MUST BE REMOVED TO THE SUGGESTED POINT AFTER INSTALLATION.
SPECIFICATIONS
20D-0550-C


BLV-170
TF.TYPE EXPANSION JOINT
MITSUI ENGINEERING & SHIP BUILDING CO.,LTD.
TOFLE CO., INC.
REMOVE SHIPPING BOLTS AFTER INSTALLATION
SPECIFICATIONS
20D-0490-D

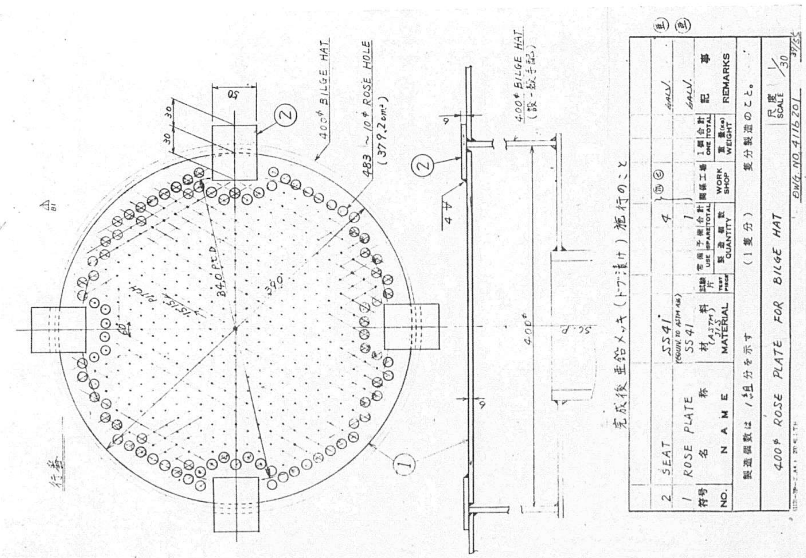

FOV-50
TF.TYPE EXPANSION JOINT
MITSUI ENGINEERING & SHIP BUILDING CO.,LTD.
TOFLE CO., INC.
REMOVE SHIPPING BOLTS AFTER INSTALLATION
SPECIFICATIONS
20D-0500-C

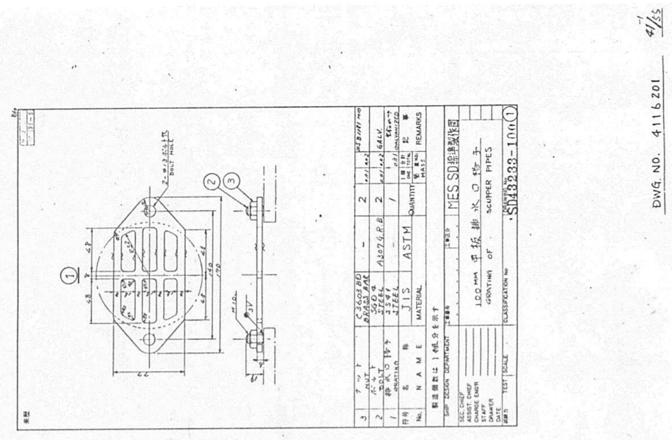

BLV-171
TF.TYPE EXPANSION JOINT
MITSUI ENGINEERING & SHIP BUILDING CO.,LTD.
TOFLE CO., INC.
REMOVE SHIPPING BOLTS AFTER INSTALLATION
SPECIFICATIONS
20D-0480-D

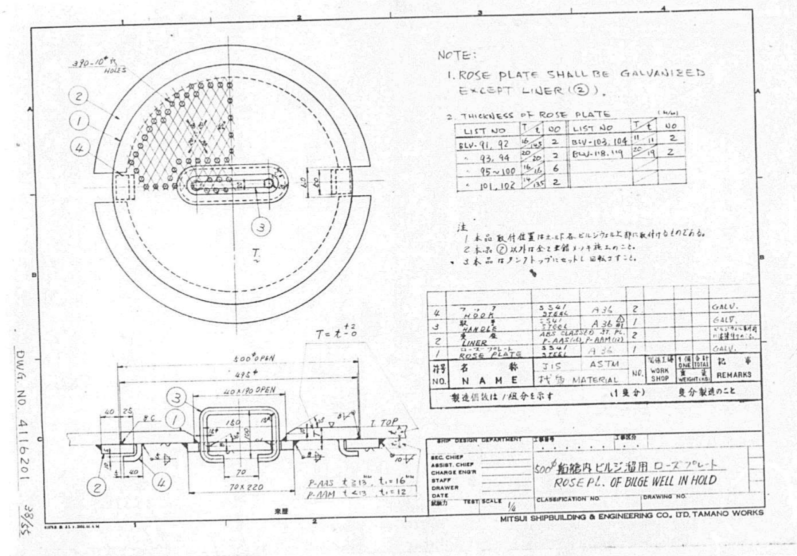

FOV-50
TF.TYPE EXPANSION JOINT
MITSUI ENGINEERING & SHIP BUILDING CO.,LTD.
TOFLE CO., INC.
REMOVE SHIPPING BOLTS AFTER INSTALLATION
SPECIFICATIONS
20D-0510-C

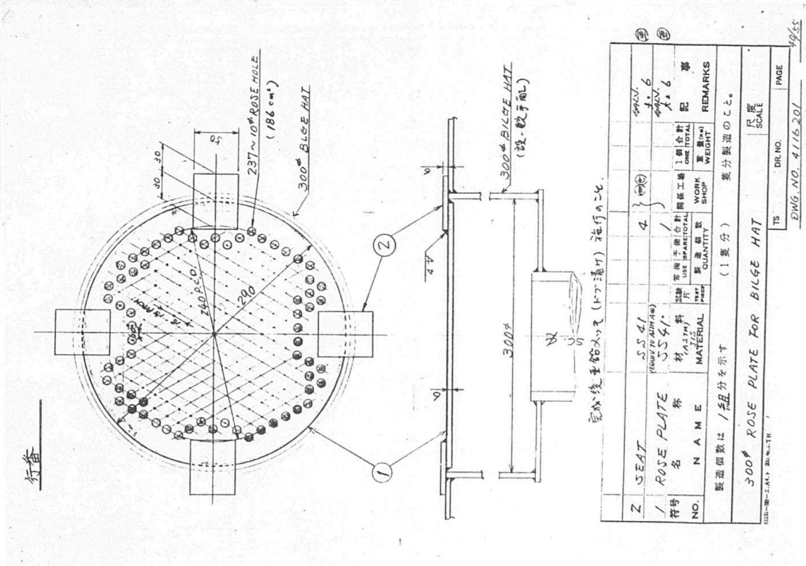

BWV-71
TF.TYPE FLEXIBLE TUBE
MITSUI ENGINEERING & SHIP BUILDING CO.,LTD.
TOFLE CO., INC.
REMOVE SHIPPING BOLTS AFTER INSTALLATION
SPECIFICATIONS
AAD-0620-D
DWG. NO. 4116201

1587






NOTE:
1. ROSE PLATE SHALL BE GALVANIZED EXCEPT LINER (②).
2. THICKNESS OF ROSE PLATE
ROSE PL. OF BILGE WELL IN HOLD
MITSUI SHIPBUILDING & ENGINEERING CO. LTD. TAMANO WORKS



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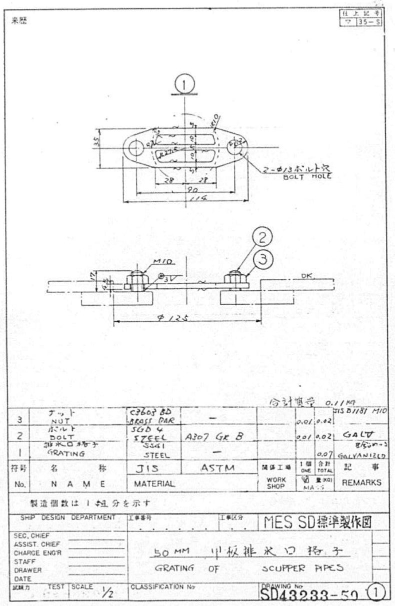
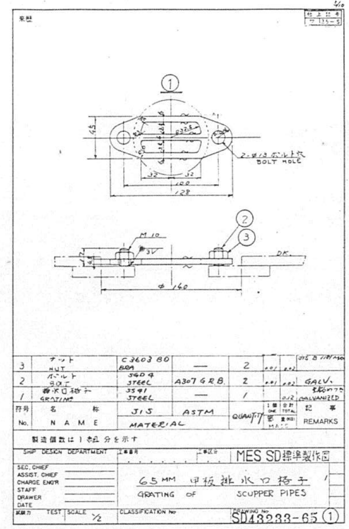


DWG. NO. 4116201 41-2/55



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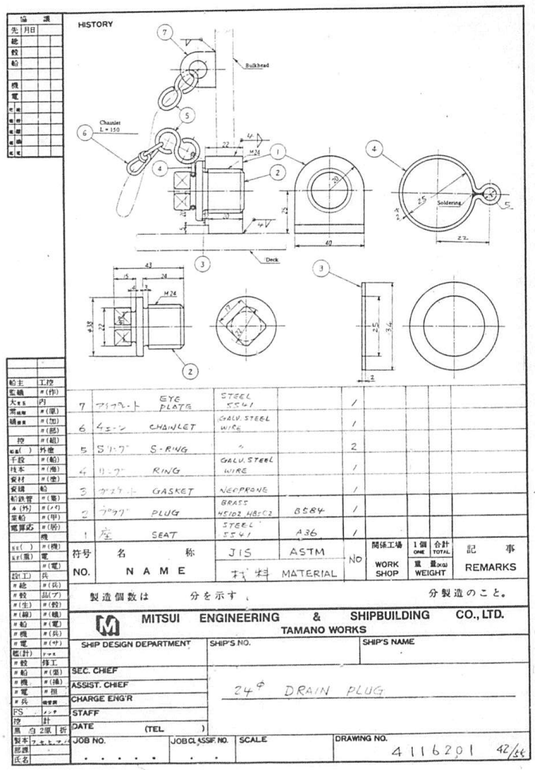
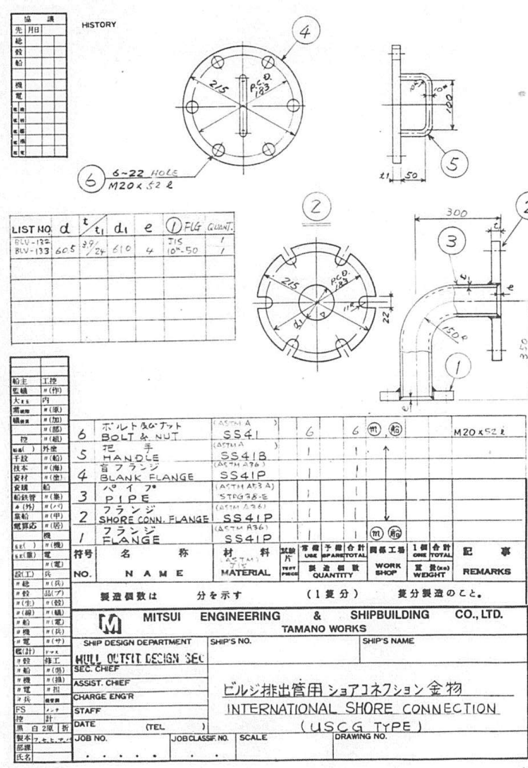
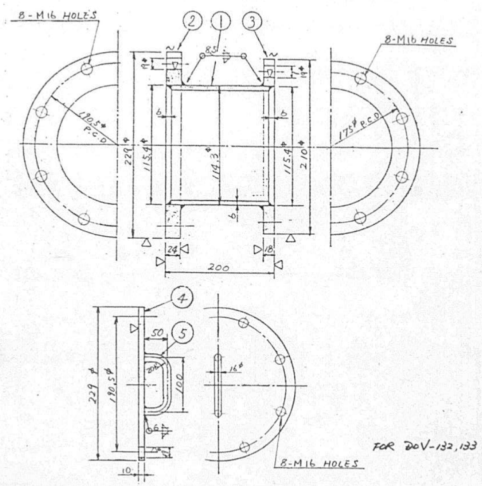




DWG. NO. 4116201 43/55

1589

製造表原紙



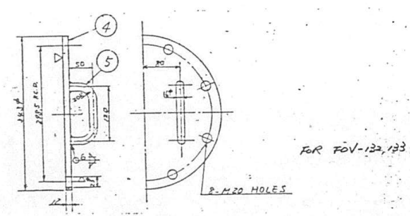
符号 NO.	名称 NAME	JIS MATERIAL	ASTM	NO.	関係工場 WORK SHOP	1個 ONE 重量(kg) WEIGHT	合計 TOTAL	記事 REMARKS
5	HANDLE	SS41B	A307	1				
4	ANSI 150LB-4" BLANK FLANGE	SS41P	A36	1				
3	JIS 10K-100 FLANGE	〃	〃	1				
2	ANSI 150LB-4" FLANGE	SS41P	A36	1				
1	PIPE	STPG-38-E (SCH 40)	A53A (SCH 40)	1				

製造個数は 1組 分を示す　（1隻分）　隻分製造のこと。

ANSI 150LB-4" × JIS10K-100 DISTANCE PIECE & ANSI 150LB-4" BLANK FLANGE　尺度 SCALE ～

TS.　DR. NO.　PAGE

DWG. NO. 4116201　44/65



符号 NO.	名称 NAME	JIS MATERIAL	ASTM	NO.	関係工場 WORK SHOP	1個 ONE 重量(kg) WEIGHT	合計 TOTAL	記事 REMARKS
5	HANDLE	SS41B	A307	2				
4	ANSI 150LB-8" BLANK FLANGE	SS41P	A36	1				
3	JIS 10K-200 FLANGE	〃	〃	1				
2	ANSI 150LB-8" FLANGE	SS41P	A36	1				
1	PIPE	STPG-38-E (SCH 40)	A53A (SCH 40)	1				

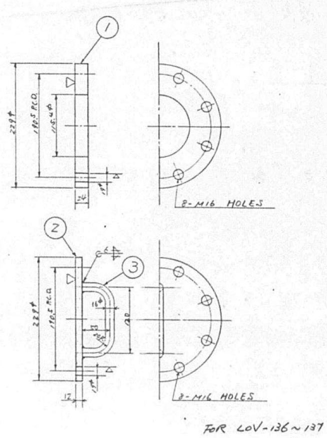
製造個数は 1組 分を示す　（1隻分）　隻分製造のこと。

ANSI 150LB-8" BLANK FLANGE　尺度 SCALE ～

TS.　DR. NO.　PAGE

DWG. NO. 4116201　45/65

来歴



符号 NO.	名称 NAME	JIS MATERIAL	ASTM	NO.	関係工場 WORK SHOP	1個 ONE 重量(kg) WEIGHT	合計 TOTAL	記事 REMARKS
3	HANDLE	SS41B		1				16φ R.B.
2	BLANK FLANGE	SS41P		1				
1	FLANGE	SS41P		1				ANSI150LB-4"

製造個数は 1組 分を示す　（1隻分）　隻分製造のこと

SHIP DESIGN DEPARTMENT

SEC. CHIEF / ASSIST. CHIEF / CHARGE ENG'R / STAFF / DRAWER / DATE / 試験力　TEST　SCALE

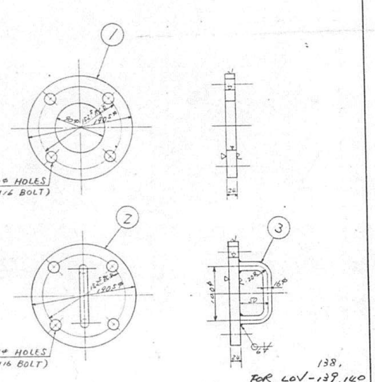
ANSI 150LB - 4" FLANGE & BLANK FLANGE

CLASSIFICATION NO.　DRAWING NO.

MITSUI SHIPBUILDING & ENGINEERING CO., LTD. TAMANO WORKS

DWG. NO. 4116201　46/65

来歴



符号 NO.	名称 NAME	JIS MATERIAL	ASTM	NO.	関係工場 WORK SHOP	1個 ONE 重量(kg) WEIGHT	合計 TOTAL	記事 REMARKS
3	HANDLE	SS41-B		2	〃			16φ R.B.
2	BLANK FLANGE	SS41-P		2	-			ANSI150LB-3"
1	FLANGE	SS41-P		2				ANSI150LB-3"

製造個数は 1組 分を示す　（1隻分）　隻分製造のこと

SHIP DESIGN DEPARTMENT
HULL OUTFIT. DESIGN SEC.

SEC. CHIEF / ASSIST. CHIEF / CHARGE ENG'R / STAFF / DRAWER / DATE / 試験力　TEST　SCALE

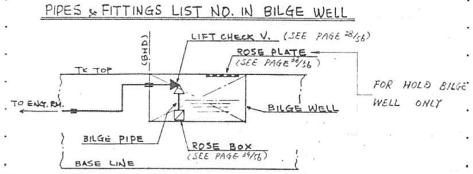
ANSI 150LB - 3" FLANGE & BLANK FLANGE

CLASSIFICATION NO.　DRAWING NO.

MITSUI SHIPBUILDING & ENGINEERING CO., LTD. TAMANO WORKS

DWG. NO. 4116201　47/65

PIPES & FITTINGS LIST NO. IN BILGE WELL



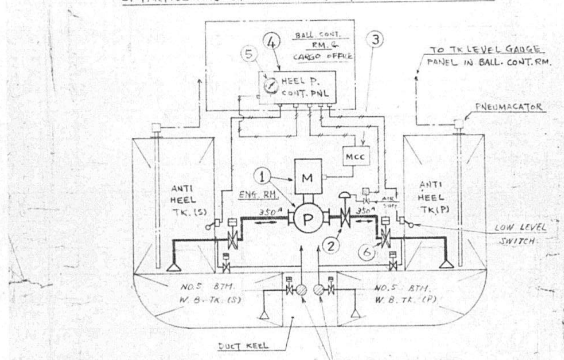
LOCATION		NOMI. SIZE	PIPE LIST NO.	FITTINGS LIST NO. LIFT CHECK V.	ROSE BOX	CASKADE PLATE	ROSE PLATE	REMARKS
NO.1 HOLD	S	125A	BL-201	BLV-1	BLV-31	—	BLV-91	
	P		202	2	32	—	92	
NO.2 HOLD	S	〃 A	203	3	33	—	93	
	P		204	4	34	—	94	
NO.3 HOLD	S	〃 A	205	5	35	—	95	
	P		206	6	36	—	96	
NO.4 HOLD	S	〃 A	207	7	37	—	97	
	P		208	8	38	—	98	
NO.5 HOLD	S	〃 A	209	9	39	—	99	
	P		210	10	40	—	100	
NO.6 HOLD (MIDDLE)	S	〃 A	211	11	41	—	101	
	P		212	12	42	—	102	
	S	—	—	—	—	—	118	
(AFT)	P		—	—	—	—	119	
FWD MACHINERY SPACE		100A	BL-430	BLV-15	BLV-45	—	—	
NO.5 HOLD	S	80A	BL-260	BLV-80	BLV-140	—	BLV-103	
(MIDDLE)	P		BL-261	BLV-81	BLV-141	—	BLV-104	

TS1323/4/5

DIAGRAM OF HEEL CONTROL SYSTEM

NOTE :

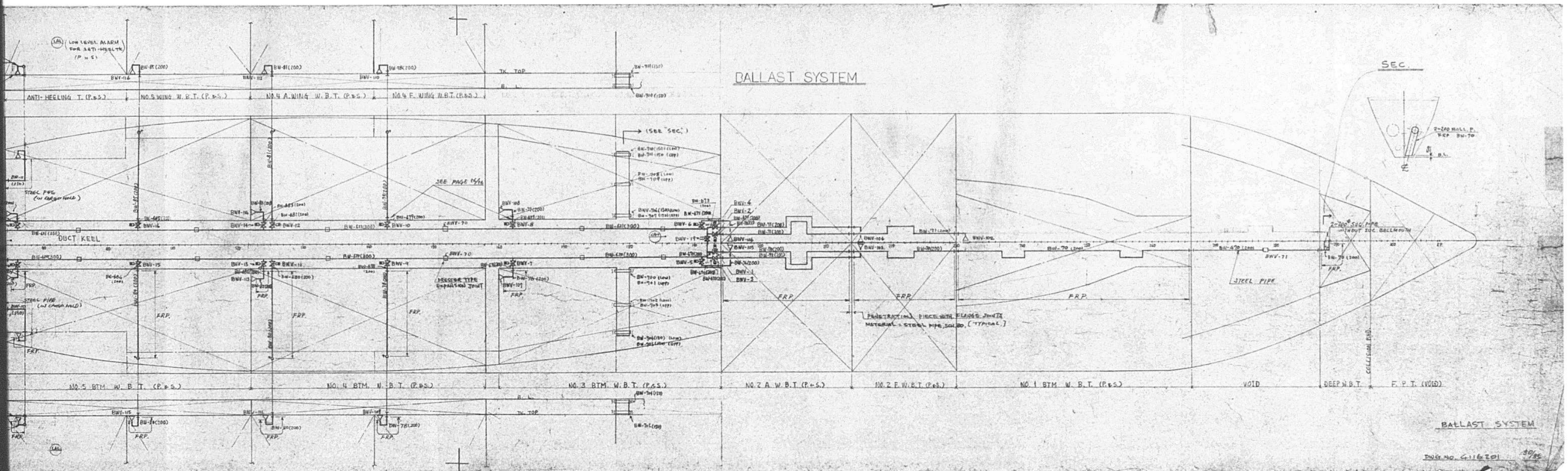
1. THE HEEL CONTROL SYSTEM SHALL BE OPERATED AT "BALL CONTROL ROOM & CARGO OFFICE."
2. PARTICULARS OF HEELING PUMP : 1000 m^3/HR × T. 25 M



EQUIPMENT LIST

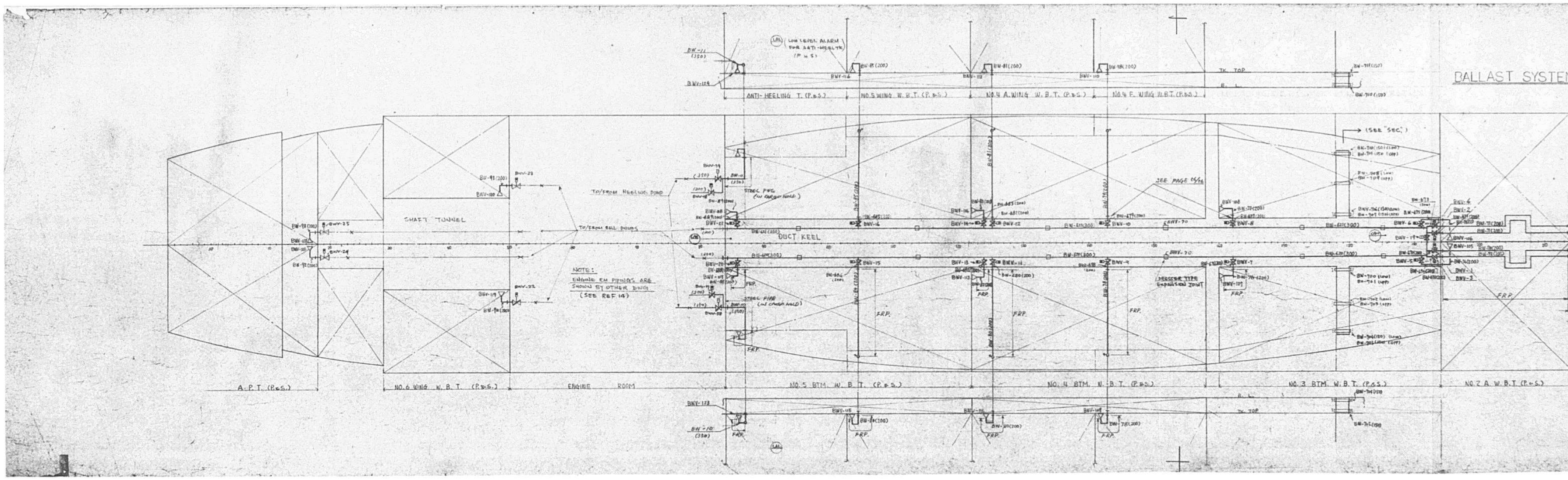
1. HEELING PUMP & ELECT. MOTOR
2. SHUT OFF VALVE (PNEUMATIC OPERAT.)
3. ELECT. MOTOR STARTER
4. HEELING PUMP CONTROL PANEL
5. INCLINOMETER
6. BUTTERFLY VALVE (HYD. OPERAT.)

1591

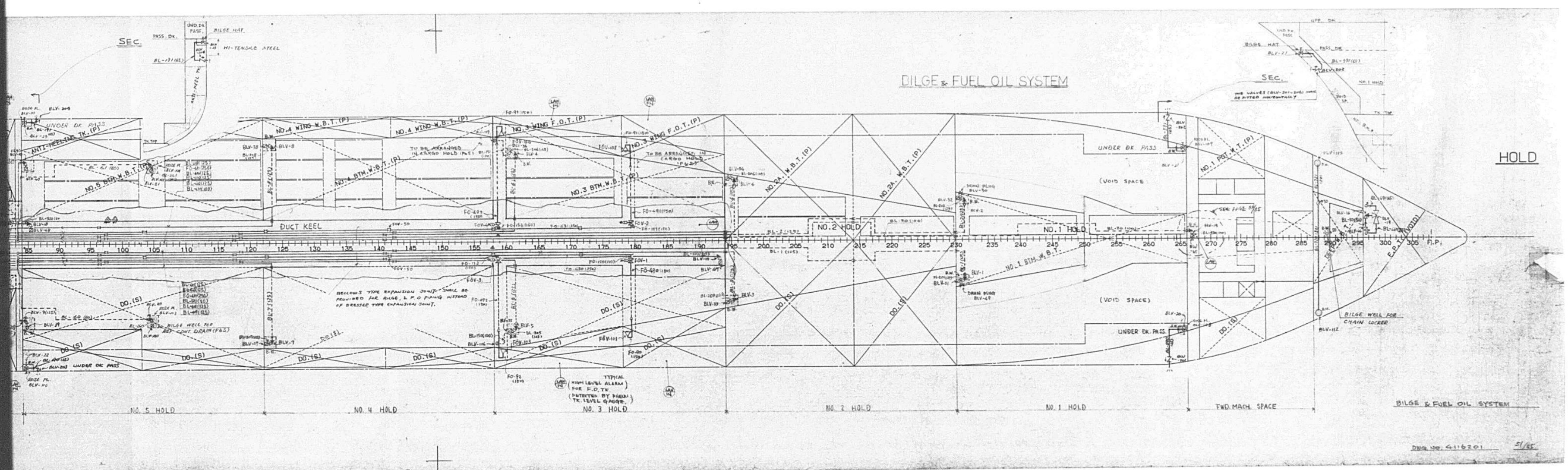


BALLAST SYSTEM
SEC.
ANTI-HEELING T. (P&S)
DUCT KEEL
STEEL PIPE
FRP.
VOID
F.P.T. (VOID)
BALLAST SYSTEM

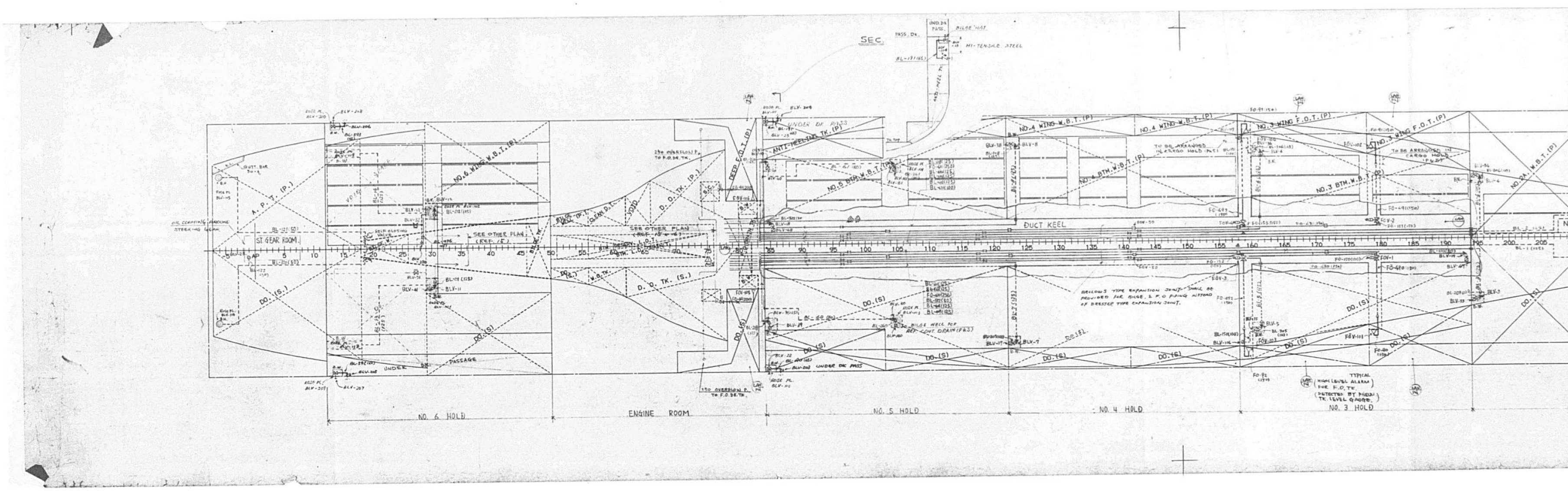
1592

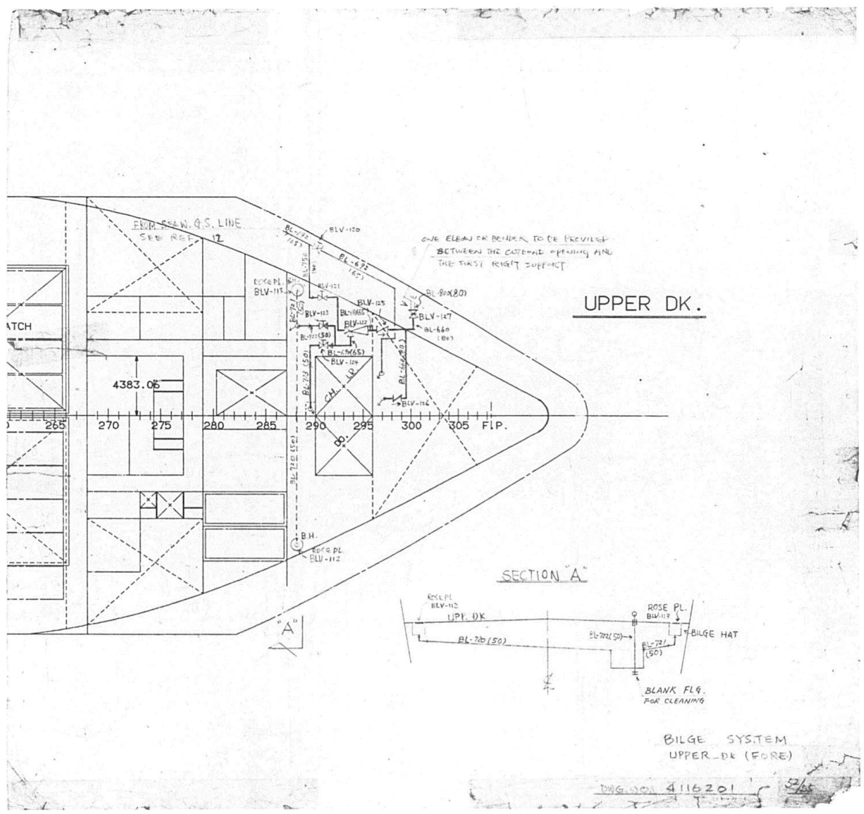

BALLAST SYSTEM
ANTI-HEELING T. (P.&S.)
NO.5 WING W.B.T. (P.&S.)
SHAFT TUNNEL
DUCT KEEL
NOTE:
ENGINE ER PIPINGS ARE SHOWN BY OTHER DWG (SEE REF 14)
A.P.T. (P.&S.)
NO.6 WING W.B.T. (P.&S.)
ENGINE ROOM
NO.5 BTM. W.B.T. (P.&S.)
NO.4 BTM. W.B.T. (P.&S.)
NO.3 BTM. W.B.T. (P.&S.)
NO.2 A. W.B.T. (P.&S.)
F.R.P.

2/2 1593

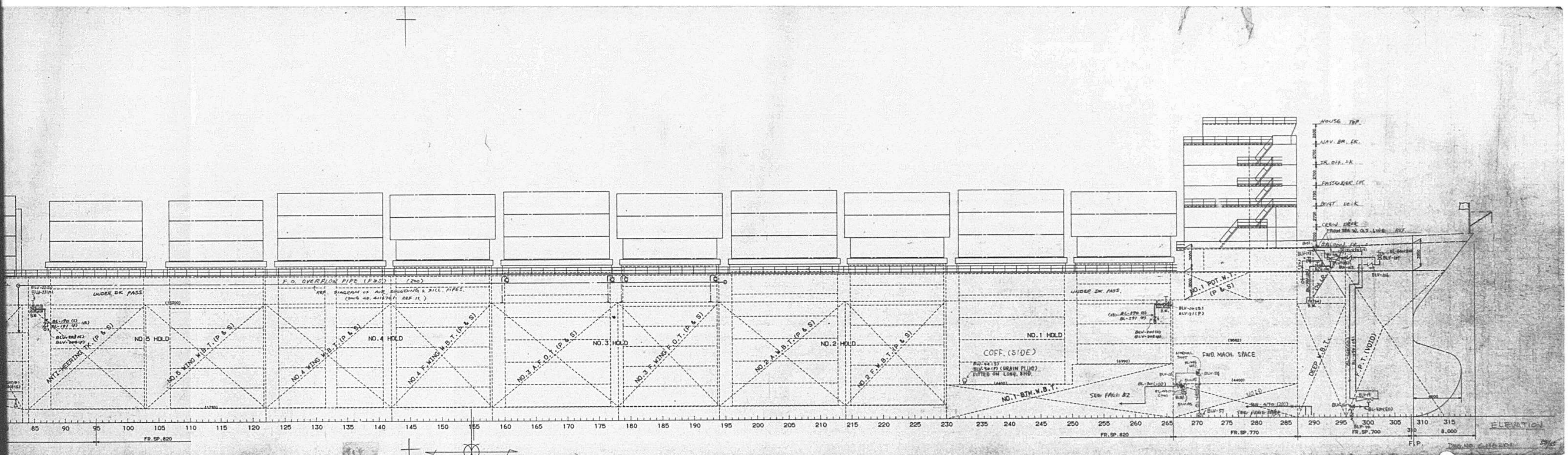

BILGE & FUEL OIL SYSTEM
HOLD
DUCT KEEL
NO. 5 HOLD
NO. 4 HOLD
NO. 3 HOLD
NO. 2 HOLD
NO. 1 HOLD
FWD. MACH. SPACE
UNDER DK. PASS
(VOID SPACE)
BILGE WELL FOR CHAIN LOCKER
BILGE & FUEL OIL SYSTEM

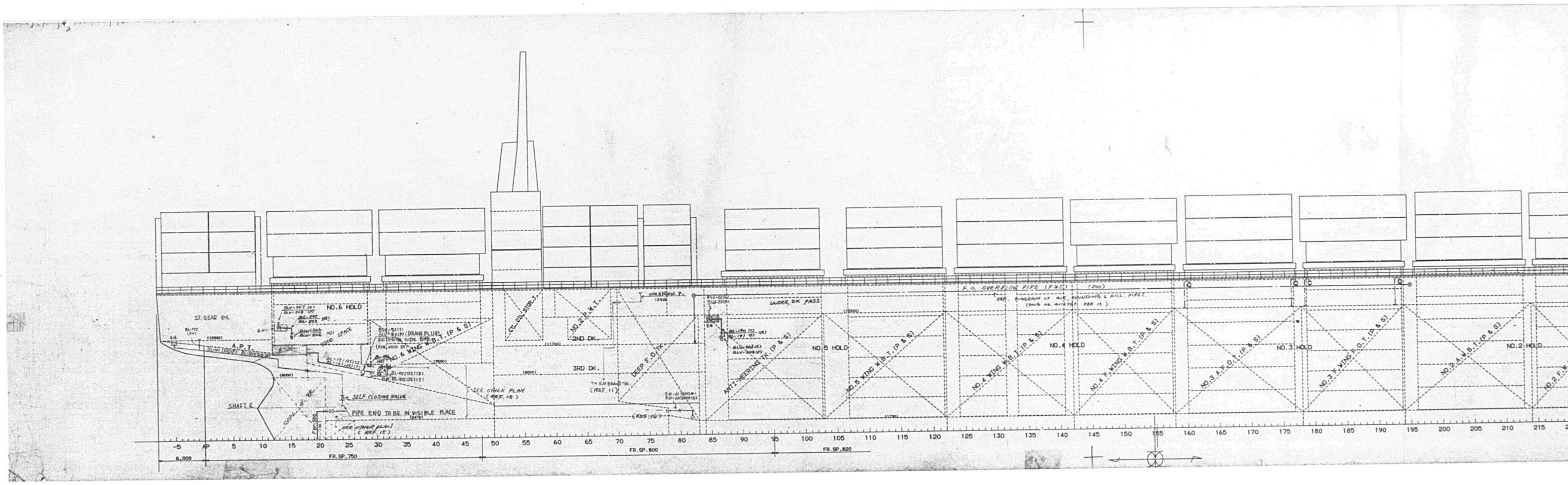
1594


NO. 6 HOLD
ENGINE ROOM
NO. 5 HOLD
NO. 4 HOLD
NO. 3 HOLD
DUCT KEEL
ST. GEAR ROOM
SEC.
HI-TENSILE STEEL
UNDER PASSAGE
SEE OTHER PLAN
D. O. TK. (S.)
D. O. TK. (P.)
NO. 4 WING W.B.T. (P)
NO. 3 WING F.O.T. (P)
NO. 3 BTM. W.B.T.
NO. 4 BTM. W.B.T.
NO. 6 WING W.B.T. (P)
DO. (S)
A. P. T. (P.)


UPPER DK.
SECTION "A"
UPP. DK
ROSE PL.
BILGE HAT
BLANK FLG.
FOR CLEANING
BH.
"A"
4383.05
265
270
275
280
285
290
295
300
305
F.P.
BILGE SYSTEM
UPPER DK (FORE)
4116201

1596

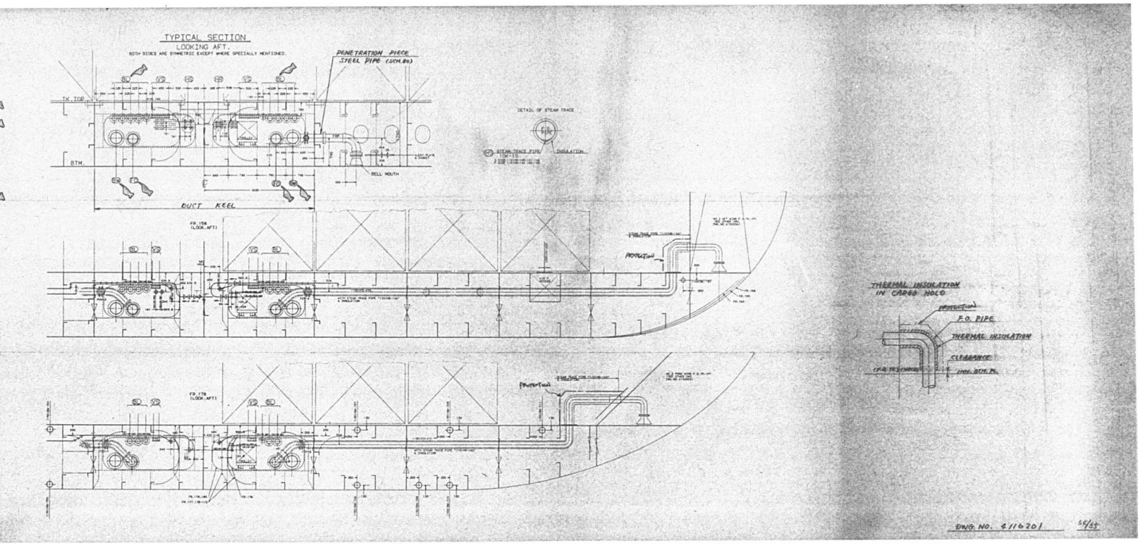

NO.5 HOLD
NO.4 HOLD
NO.3 HOLD
NO.2 HOLD
NO.1 HOLD
COFF. (SIDE)
ELEVATION

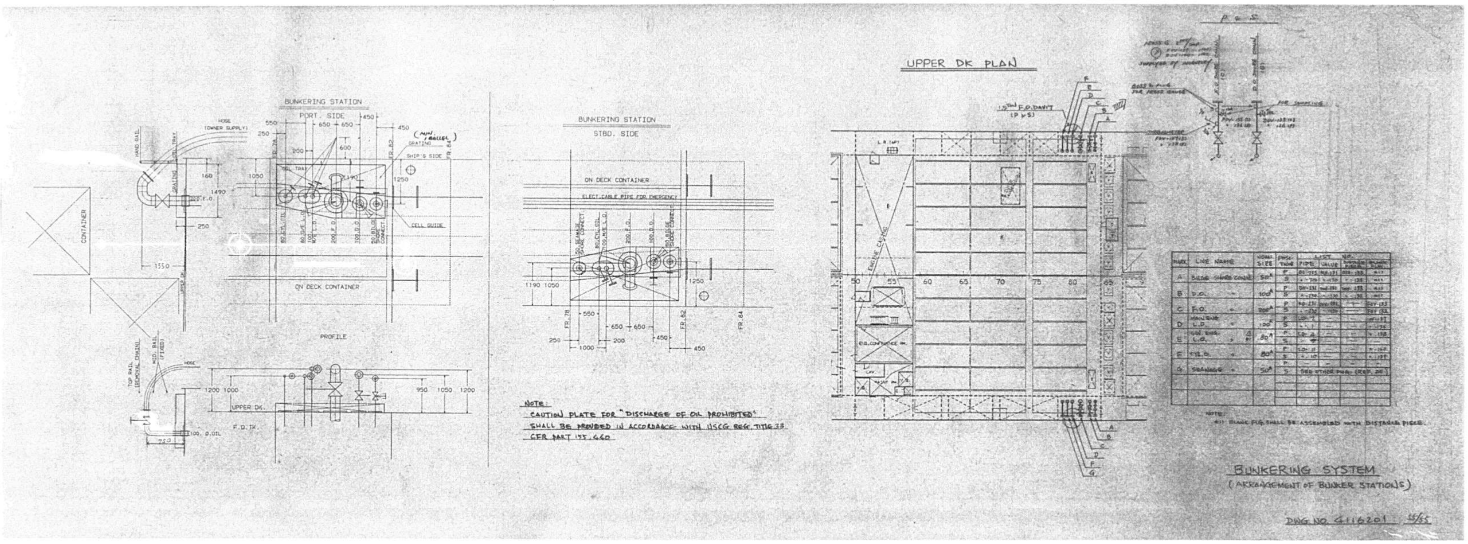

NO.6 HOLD
ST. GEAR RM.
A.P.T.
SHAFT ℄
2ND DK.
3RD DK.
DEEP F.O.TK.
NO.5 HOLD
NO.4 HOLD
NO.3 HOLD
NO.2 HOLD
PIPE END TO BE IN VISIBLE PLACE
SELF CLOSING VALVE
SEE OTHER PLAN
ANTI-HEELING TK. (P & S)
FR.SP.750
FR.SP.800
FR.SP.820

2/2

1598

MARK	PIPE LIST NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025




BUNKERING STATION
PORT. SIDE
BUNKERING STATION
STBD. SIDE
ON DECK CONTAINER
CONTAINER
PROFILE
UPPER DK.
CELL GUIDE
SHIP'S SIDE
UPPER DK PLAN
NOTE:
CAUTION PLATE FOR "DISCHARGE OF OIL PROHIBITED"
SHALL BE PROVIDED IN ACCORDANCE WITH USCG REG. TITLE 33
CFR PART 155.460
NOTE:
BLANK FLG SHALL BE ASSEMBLED WITH DISTANCE PIECE.
BUNKERING SYSTEM
(ARRANGEMENT OF BUNKER STATIONS)
DWG NO. G116201 55/55

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	(RECEIVED) JAN. 11 '85	[illegible]	FEB. 15 '85	7-8-2		
REV. 01	MAY 31 '85	[illegible]/MES-492	JUL. 11 '85	7-8-2		
REV. 02	OCT. 7 '85	TAM/83	NOV. 22 '85	7-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO. 1323	DOCTOR LYKES	NO. 1158	JAMES LYKES
NO. 1324	ALMERIA LYKES	NO. 1159	JOSEPH LYKES
NO. 1325	TILLIE LYKES	NO. 1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — MANAGER: I. Tabuchi
OUTFIT DESIGN SECT (PIPING)
SEC. CHIEF
SHIP'S NO.
SHIP'S NAME: **TILLIE LYKES**

機関部
ビルジ及び廃油処理管系図
BILLGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENGINE ROOM

DATE (TEL. 2240 / 3241) — JOB NO. — SCALE — JOBCLASSIF. NO.
LYKES REF. NO. 480102 — MITSUI DRAWING NO. 5131020 — REV.

(14 SHEETS WITH COVER)

A4-1/2 B2- A3- B1-

PLAN RECORD

5131020

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. No. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. No. 1324 AND S. No. 1325.	JUN. 26 '86

DWG. NO. 5131020 — 1

GENERAL NOTE

5131020

THIS DRAWING IS REFERRED TO THE FOLLOWING DRAWING.
DWG. NO. 5131020
BILGE & WASTE OIL DISPOSAL PIPING
DIAGRAM IN ENGINE ROOM

DWG. NO. 5131020 — 2

PLAN RECORD

1-½

5131020

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. No. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. No. 1324 AND S. No. 1325.	JUN. 26 '86
03	△	REVISED BY THE FOLLOWING REASON OWNER'S REQUEST	JAN. 20 '87 A. Nishimura

DWG. NO. 5131020 — 1

1601

MODIFICATION OF BILGE SYSTEM — DEC. 26 '86

1. ONE(1) BILGE PUMP FOR D&H (DANGEROUS & HAZARDOUS) IS NEWLY PROVIDED IN DUCT KEEL TO TAKE THE SUCTION OF BILGE IN NO. 2, 3 & 4 CARGO HOLD.
   BECAUSE NO. 2, 3 & 4 CARGO HOLDS ARE INTENDED TO HOLD DANGEROUS CARGO SOMETIMES.

2. PRINCIPAL PARTICULAR OF NEW BILGE PUMP
   - NAME : BILGE PUMP FOR D & H
   - NUMBER OF SET : 1
   - TYPE : AIR OPERATED DIAPHRAGM PUMP
   - CAPACITY : 10 m³/h, ±45 m

3. CONNECTION METHOD FOR PIPE, VALVE AND PUMP IN BILGE SYSTEM
   1). PIPE TO PIPE : BUTT WELDING OR SLEEVE JOINT
   2). VALVE & PUMP : FLANGE TYPE

   REMARKS:
   THESE CONNECTION METHODS SHALL BE APPLIED TO MODIFICATION PARTS ONLY. THE EXISTING BILGE LINE IS REMAINED AS IT IS.

4. THE FOLLOWING EQUIPMENTS SHALL BE SUPPLIED BY OWNER.
   1). AIR OPERATED DIAPHRAGM PUMP — 1 SET
   2). AIR FILTER REGULATOR UNIT — 1 SET

REFERENCE DRAWING

NO.	REV. NO.	DWG. NO.	DWG. NAME
1.		4116201	DIAGRAM OF BILGE, BALLAST AND FUEL OIL LINES
2.		5131019	FIRE G.S. & BALLAST PIPING DIAGRAM IN ENGINE ROOM
3.		5131013	F.O. SERVICE PIPING DIAGRAM IN ENGINE ROOM

5131020

CODED GROUP SYSTEM OF PIPING DIAGRAM

区分 (DIVISION) / 管系 (SYSTEM)	記号および番号 (DIVISION OF SYMBOL NUMBER) 管 (PIPE)	弁.コック.こし器 (VALVE.COCK)
ビルジ管系 BILGE	1W - 1 ~ 999	1WV - 1 ~ 999
排水管系 OPEN BILGE	9W - 1 ~ 999	9WV - 1 ~ 999

5131020

5-1/2

SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT
		GATE (SLUICE) VALVE	:BUTT OR SOCKET WELDING ENDED
		BUTTERFLY VALVE	:UNION ENDED
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	:LOCKED CLOSE
		SCREW DOWN CHECK VALVE	:LOCKED OPEN
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE:
		PRESS. REDUCING VALVE (DIRECT OPERATING TYPE)	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
COCK		TWO-WAY COCK	:LOCKED CLOSE
		THREE-WAY COCK	:LOCKED OPEN
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

5-3 9(2×8)

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER
		PISTON TYPE (ON-OFF CONTROL)	:WITH POSITIONER
		PISTON TYPE (OPEN DEGREE CONTROL)	:WITH MANUAL HANDLE
		ELECTRIC MOTOR TYPE	
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS.-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	● :WITH STOP VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	○ :WITHOUT VALVE
		FLAT GLASS LEVEL GAUGE	:WITH SELF CLOSING VALVE
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE:
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	TANK
		LEVEL INDICATOR	
		VISCOSITY INDICATOR	
		PRESSURE GAUGE	
		COMPOUND GAUGE	
		VACUUM GAUGE	
		DIFF. PRESS. GAUGE	
		THERMOMETER	
		REMOTE THERMOMETER	
		FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETECTOR		PRESSURE SWITCH	
		TEMPERATURE SWITCH	
		LEVEL (FLOAT) SWITCH	
		FLOW SWITCH	
		SALINITY CELL	
		ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
		MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

KIND	SYMBOL	NAME	REMARK
SAMPLE		---SYMBOL ---INSTRUMENT NO.	
INDICATOR		PRESSURE INDICATOR	
		VACUUM INDICATOR	
		COMPOUND INDICATOR	
		DIFF. PRESS. INDICATOR	
		TEMPERATURE INDICATOR	
		LEVEL INDICATOR	
		VISCOSITY INDICATOR	
		DENSITY INDICATOR	
		SALINITY INDICATOR	
		FLOW INDICATOR	
		OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL		PRESSURE CONTROL	
		TEMPERATURE CONTROL	
		LEVEL CONTROL	
		VISCOSITY CONTROL	
		AUTOMATIC CONTROL	
		EMER. SHUT DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		EMER. SLOW DOWN	
		AUTOMATIC START	
		AUTOMATIC STOP	
		AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM		HIGH PRESSURE ALARM	
		LOW PRESSURE ALARM	
		HIGH DIFF. PRESS. ALARM	
		HIGH TEMPERATURE ALARM	
		LOW TEMPERATURE ALARM	
		TEMP. DEVIATION HIGH ALARM	
		HIGH LEVEL ALARM	
		LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		HIGH VISCOSITY ALARM	
		LOW VISCOSITY ALARM	
		HIGH DENSITY ALARM	
		HIGH SALINITY ALARM	
		OVER FLOW ALARM	
		NON FLOW ALARM	
		GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

5131029

MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131020

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
BILGE SUCTION LINE IW-201~210 (~~220~~)	125	5	139.8	9.5	WELDED CARBON STEEL PIPE STPG38-E JIS G3454 (Sch80) (EQUIVALENT TO ASTM A53GrA) (Sch 80) GALVANIZED	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS 41 (EQUIVALENT TO ASTM A36)	—		—	—	—	45 (113°F)	0 (0psi) ~ 4.5 (64psi)
BILGE FOR D.B.H IW-211~220	65	2½	76.3	7.0					SOUNDING HEAD CAST BRONZE SCREWD BC6 JIS H5111 (EQUIVALENT TO ASTM B62)					
	50	2	60.5	5.5										
BILGE SOUNDING LINE IW-221~250	65	2½	76.3	5.2	Sch.40 WELDED CARBON STEEL PIPE STPG38-E JIS G3454 (EQUIVALENT TO ASTM A53GrA) (Sch.80 or Sch.40)									
	50	2	60.5	5.5										
	40	1½	48.6	5.1	Sch.80									

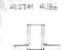
5131020

MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131020

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
BILGE OPEN DRAIN & AIR VENT LINE (9W-1~60)	200	8	216.3	8.2	WELDED CARBON STEEL PIPE STPG 38-E Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G3101) (EQUIVALENT TO ASTM A36) OR BUTT WELDING OR SLEEVE JOINT	JIS 10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA OR ASTM A216 WCB)	DISC & SEAT; CAST BRONZE BC6 JIS H5111 (BC6) OR STAINLESS STEEL SCS 13A JIS G5121 (EQUIVALENT TO ASTM A351 CF8) OR CAST STEEL FACED WITH STAINLESS STEEL STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE STPG38-E Sch40 JIS G3454 (EQUIVALENT TO ASTM A53GrA) GALVANIZED	45°C (113°F)	OK
	150	6	165.2	7.1										
	125	5	139.8	6.6										
ENGINE ROOM SCUPPER LINE (9W-61~100)	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)					
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-O JIS H3300 (EQUIVALENT TO ASTM B88 C12200-O)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC 6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT; CAST BRONZE BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62)		
	6	¼	8.0	1.2										

5131020

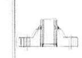
MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131020

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
BILGE SUC. LINE	350	14	355.6	9.5	STAND.	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL ASTM A105 OR BUTT WELDING 	JIS 10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA OR ASTM A216 WCB)	DISC & SEAT; CAST BRONZE BC6 JIS H5111 (BC6) OR STAINLESS STEEL SCS13A JIS G5121 (EQUIVALENT TO ASTM A351 CF8) OR CAST STEEL FACED WITH STAINLESS STEEL STEM; STAINLESS STEEL SUS 304 JIS G4303	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE GALVANIZED	45 (113°F)	0 (0psi)
IW-1~80	250	10	267.4	9.3	WELDED CARBON STEEL PIPE STPG38-E JIS G3454 (EQUIVALENT TO ASTM A53GrA) GALVANIZED									
	200	8	216.3	8.2										
	150	6	165.2	7.1										
SLUDGE SUC. LINE (IW-81~100)	125	5	139.8	6.6										
	100	4	114.3	6.0		JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (EQUIVALENT TO ASTM A36) 							
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
BILGE SEPARATOR SERVICE PUMP & BILGE PUMP DIS. LINE (IW-101~150)	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	(EQUIVALENT TO ASTM A276 TYPE 304)				[illegible]
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
SLUDGE PUMP DIS. LINE (IW-151~200)	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-O JIS H3300 (EQUIVALENT TO ASTM B88 C12200-O)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641B JIS H3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT; CAST BRONZE BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT [illegible] (EQUIVALENT TO ASTM B21 [illegible]) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62)		
	6	¼	8.0	1.2										

In compression fitting, please ref. to [illegible]

5131020

MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131020

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
SLUDGE GRINDER PUMP SUC. DIS. & RETURN LINE IW-301~350	150	6	165.2	7.1	SEAMLESS CARBON STEEL PIPE ABS-Gr.4 (EQUIVALENT TO ASTM A106GrA) PARKERIZING	JIS 16K (228psi)	STEEL SLIP-ON WELDED FLANGE with hub FORGED STEEL ASTM A105 or BUTT WELDING 	JIS 16K (228psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA OR ASTM A216 WCB)	DISC & SEAT; CAST BRONZE BC6 JIS H5111 (BC6) OR STAINLESS STEEL SCS13A JIS G5121 (EQUIVALENT TO ASTM A351 CF8) OR CAST STEEL FACED WITH STAINLESS STEEL STEM; STAINLESS STEEL SUS 304 JIS G4303	JIS 16K (228psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE ABS-Gr.4 (EQUIVALENT TO ASTM A106GrA)	85 (185°F)	1 (15psi)
	125	5	139.8	6.6										
WASTE OIL BURNING PUMP DISCHARGE LINE IW-351~400	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	(EQUIVALENT TO ASTM A276 TYPE 304)				[illegible]
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	17.3	[illegible]	SEAMLESS CARBON STEEL PIPE [illegible] (EQUIVALENT TO ASTM [illegible])	JIS [illegible] ([illegible])	FORGED STEEL BITE JOINT ASTM A105	JIS 20K (285psi)	CAST BRONZE FLARED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT; CAST BRONZE BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS [illegible] ([illegible])	FORGED STEEL BITE JOINT ASTM A105		
	6	¼	10.5	[illegible]										

5131020

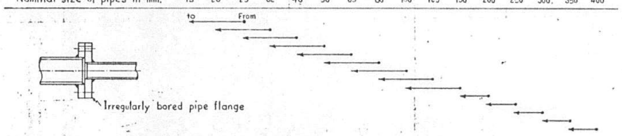
1604

Reducing method of pipe diameter

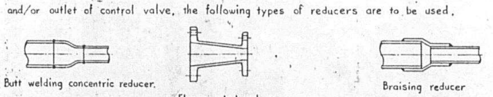
In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the difference of pipe size is within the following limits. — Irregulaly bored pipe flanges shall only be used for vent piping, air piping and scapper pipe line.

Nominal size of pipes in mm. 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400



2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.



5131020

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131020

SYSTEM	NOM. SIZE		PIPE			FLANGE		VALVE & COCK			PIECE		MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
	mm	inch	OUT.DIA mm	THICK mm	MATERIAL	PRESS. STAND	TYPE & MATERIAL	PRESS. STAND	MATERIAL BODY	MATERIAL TRIM	PRESS. STAND	MATERIAL		
~~BILGE~~ HULL TK. AIR VENT LINE 9W-101~150	125	5	139.8	6.6	WELDED CARBON STEEL PIPE	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB	JIS 10K (143psi)	AIR PIPE HEAD					
	100	4	114.3	6.0 (sch 40)										
	80	3	89.1	5.5										
	65	1½	76.3	5.2	STP438-E JIS G3454		ROLLED STEEL PLATE							
	50	2	60.5	5.5	(EQUIVALENT TO ASTM A53 Gr.A)		SS41 JIS G3101		DUCTILE CAST IRON	—	—	—	38 (100°F)	0 (0psi)
	40	1½	48.6	5.1 (sch 80)	GALVANIZED		(EQUIVALENT TO ASTM A36) OR BUTT WELDING OR SLEEVE JOINT		FCD45 (EQUIVALENT TO ASTM A395)					
~~BILGE~~ HULL TK. AIR VENT LINE (EXPOSED DK) 9W-201~250	80	3	89.1	7.6	WELDED CARBON STEEL PIPE									
	65	2½	76.3	7.0	STP438-E JIS G3454 sch 80 (EQUIVALENT TO ASTM A53 Gr.A) GALVANIZED									

5131020

5131020

SLEEVE JOINT

According to the yard's standard practice, Welding sleeve joints may be used with the limitation as mentioned hereafter.

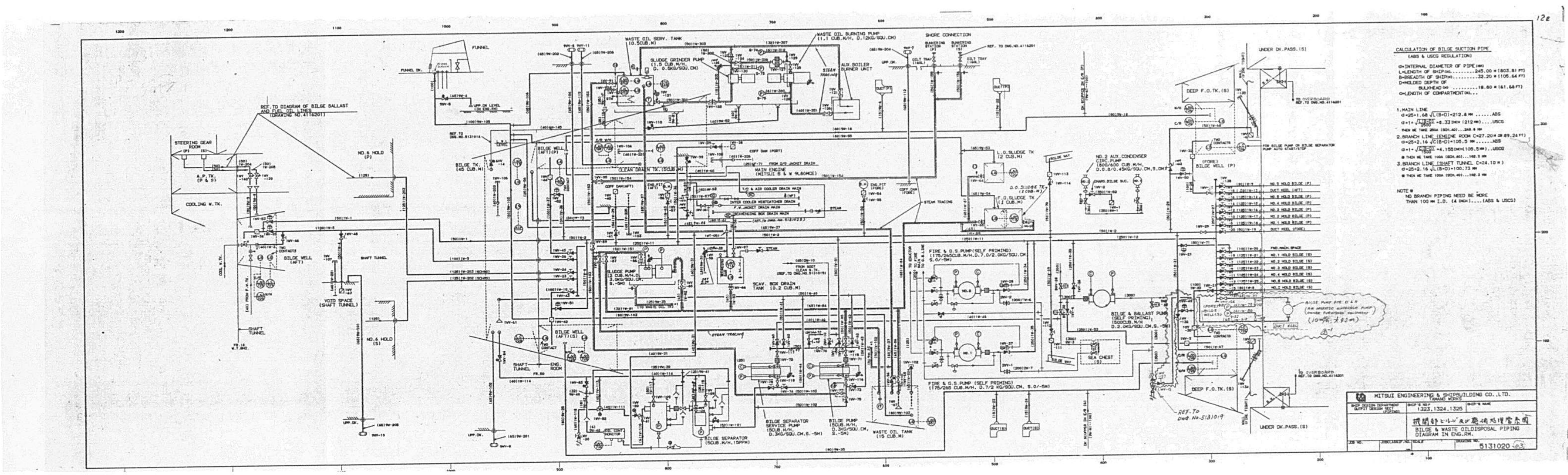
1 Piping system to be applied

Exhaust steam line
Steam drain line
Exhaust gas line
Condensate water line

— All air vent line (9W - 101 ~ 140)
— All open ended drain line (9W - 1 ~ 60)
— Open bilge scupper line (9W - 61 ~ 100)

2 Nominal diameter of the pipe
15 mm and over

1605


MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT
OUTFIT DESIGN SECT
(PIPING)
SHIP'S NO.
1323, 1324, 1325
SHIP'S NAME
機関部ビルジ及び廃油処理管系図
BILGE & WASTE OILDISPOSAL PIPING
DIAGRAM IN ENG.RM.
JOB NO.
SCALE
DRAWING NO.
5131020-03
FUNNEL
STEERING GEAR ROOM
COOLING W.TK.
BILGE WELL (AFT)
VOID SPACE (SHAFT TUNNEL)
SHAFT TUNNEL
CLEAN DRAIN TK.
SLUDGE PUMP
BILGE WELL (AFT)(S)
SLUDGE SEPARATOR
BILGE SEPARATOR
BILGE PUMP
WASTE OIL TANK
FIRE & G.S.PUMP (SELF PRIMING)
BILGE & BALLAST PUMP
SEA CHEST
DEEP F.O.TK.(S)
UNDER DK.PASS.(S)
SHORE CONNECTION
AUX BOILER BURNER UNIT
L.O.SLUDGE TK
NO.2 AUX CONDENSER
CALCULATION OF BILGE SUCTION PIPE

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY 28 '85	OFTS/MES-461			MAY 31 '85	T-8-2		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC. (PIPING)

船首水艙及深水艙諸管配置

PIPING ARR. IN FORE PEAK TANK AND DEEP W. B. TK

DATE (TEL 2242)

JOB NO. TS1323/24/25 — SCALE 1/50 — LYKES REF. NO. 480103 — MITSUI DRAWING NO. 4100060

(10 SHEETS WITH COVER)

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG NO. 4100060 2/10

GENERAL NOTE

DWG.NO. 4100060 3/10

PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

DWG.NO. 4100060 4/10

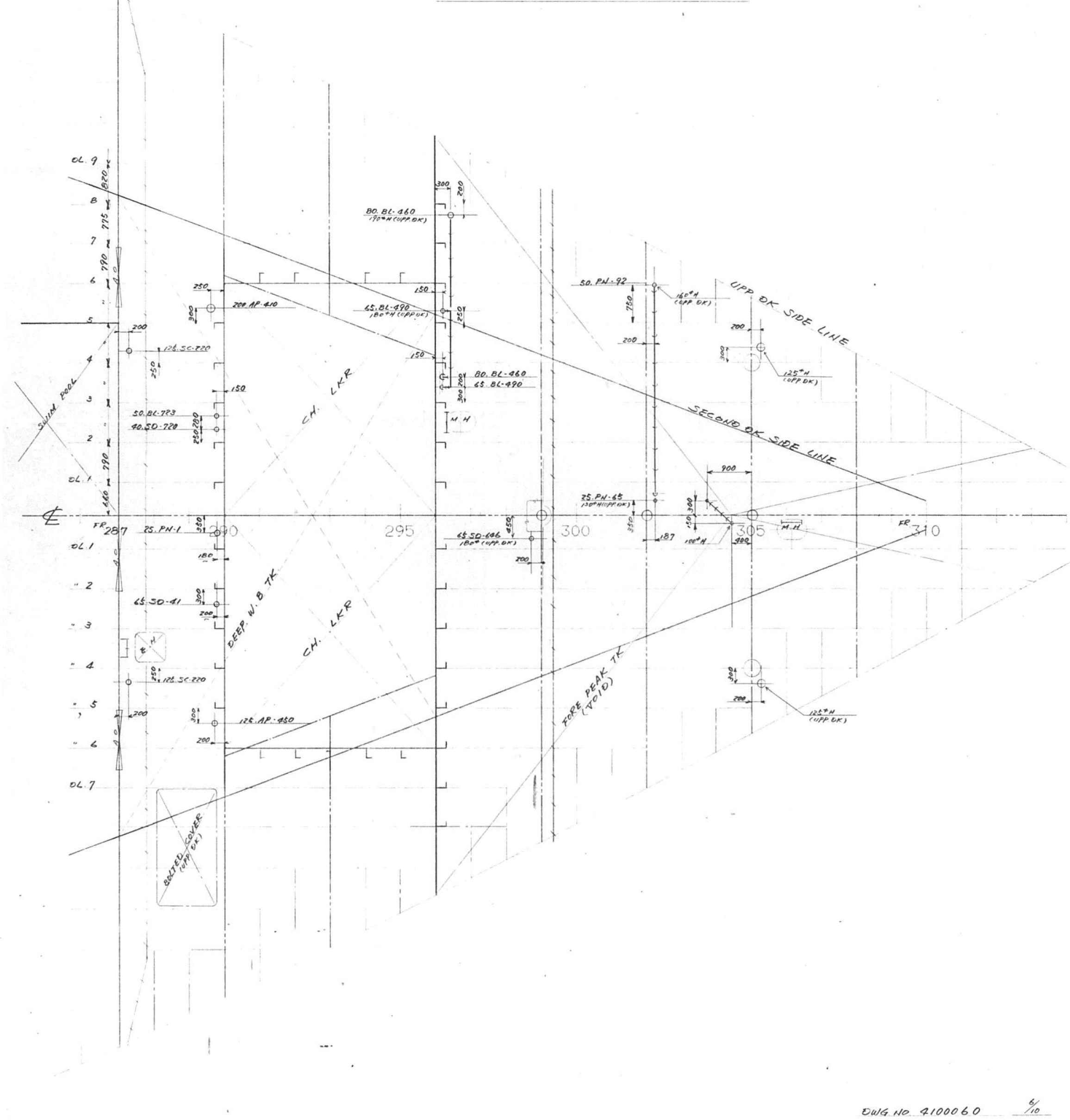
1607

FITTING LIST OF VALVE SPINDLE

SYMBOL	MARK	NAME	MATERIAL FITTING	MATERIAL JIS	MATERIAL ASTM	SIZE	QUANT.	REMARKS
	DKS 30	DECK STAND WITH HAND WHEEL DKS-30	BODY SPINDLE BUSH PACKING	SC46 SUS304 BC6 NON ASBESTOS	A216 WCA A276-304 B62	φ30	1	
	1	COUPLING (PIN TYPE)	BODY PIN	SS41B SUS304	A307 A276-304	φ30×φ25	1	
	2	UNIVERSAL JOINT (PIN TYPE)	BODY PIN	SF45 SUS304	A105 A276-304	φ25 SPINDLE	4	
	3	STOPPER	BODY WASHER	SS41P SUS304	A36 A276-304	"	2	
	4	BEARING	BODY BOLT & NUT	PHENOL RESIN SS41B	A307	"	7	
	5	SPINDLE ROD		SS41B	A307	"	SET	
	6	COUPLING (PIN TYPE)	BODY PIN	SS41B SUS304	A307 A276-304	"	2	
	7	FORK		SS41B & SS41P	A307	φ25 SPINDLE	1	
	8	SEAT			A36		1	

DWG NO. 4100060 5/10

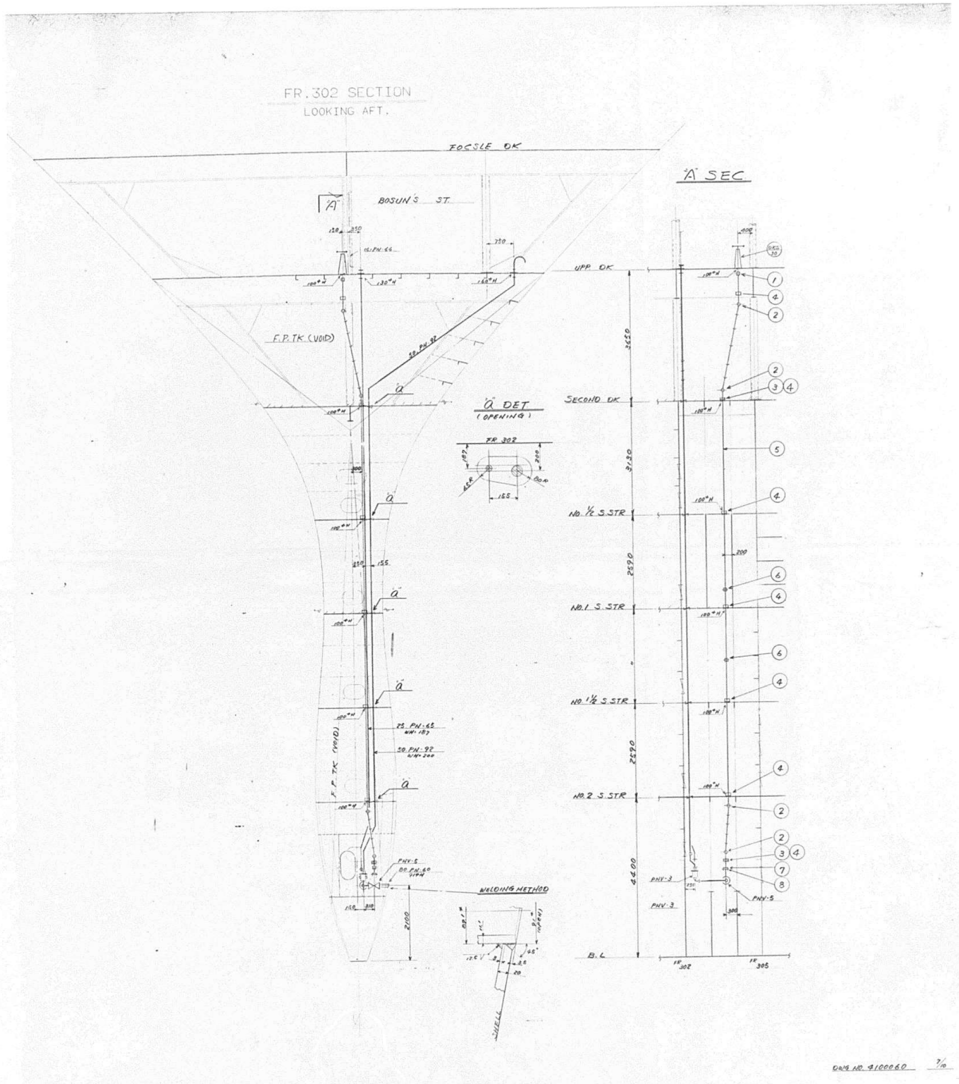
UPPER DECK UNDER PLAN



DWG NO. 4100060 6/10

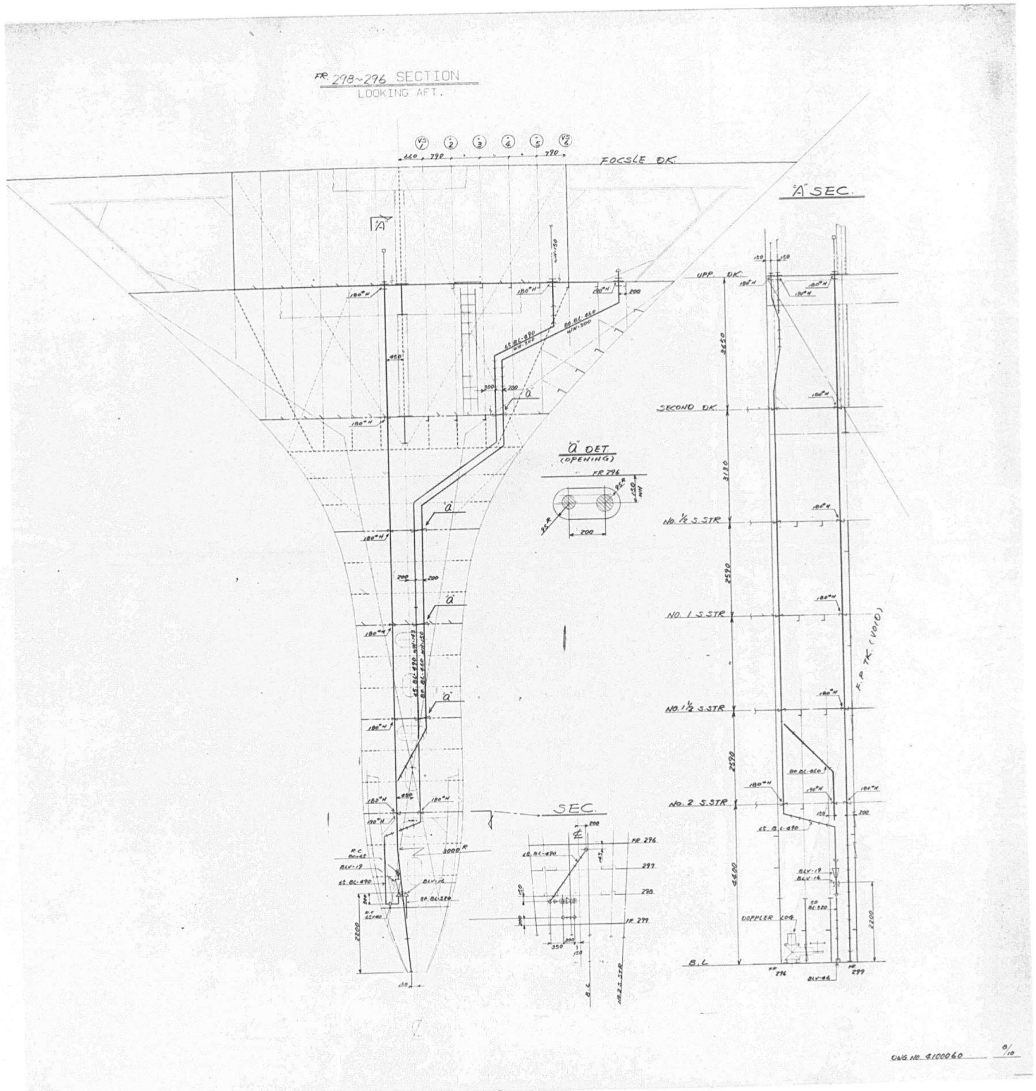
11-53(4)

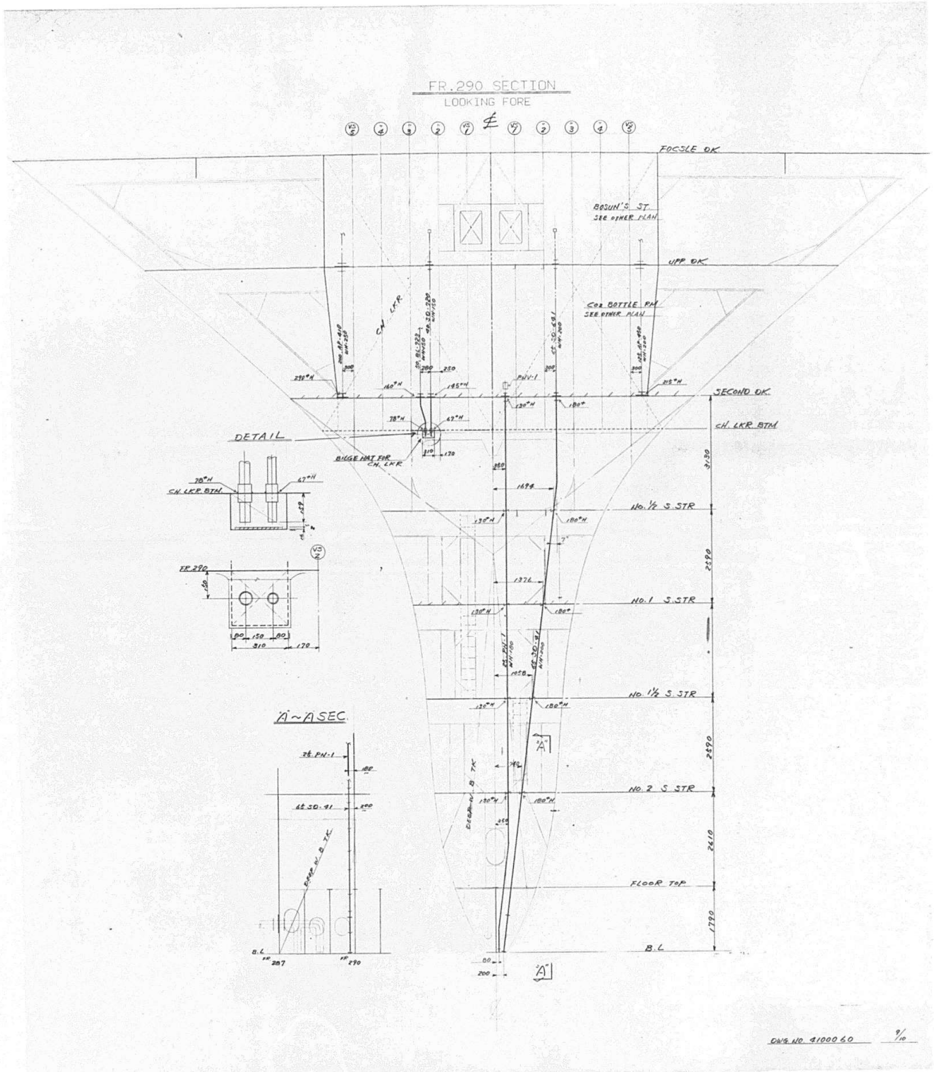
1609



FR. 302 SECTION
LOOKING AFT.
FOCSLE DK
BOSUN'S ST.
F.P. TK (VOID)
"A" SEC
UPP DK
SECOND DK
NO. 1/2 S.STR
NO. 1 S.STR
NO. 1 1/2 S.STR
NO. 2 S.STR
B.L
"a" DET
(OPENING)
FR 302
WELDING METHOD
SHELL

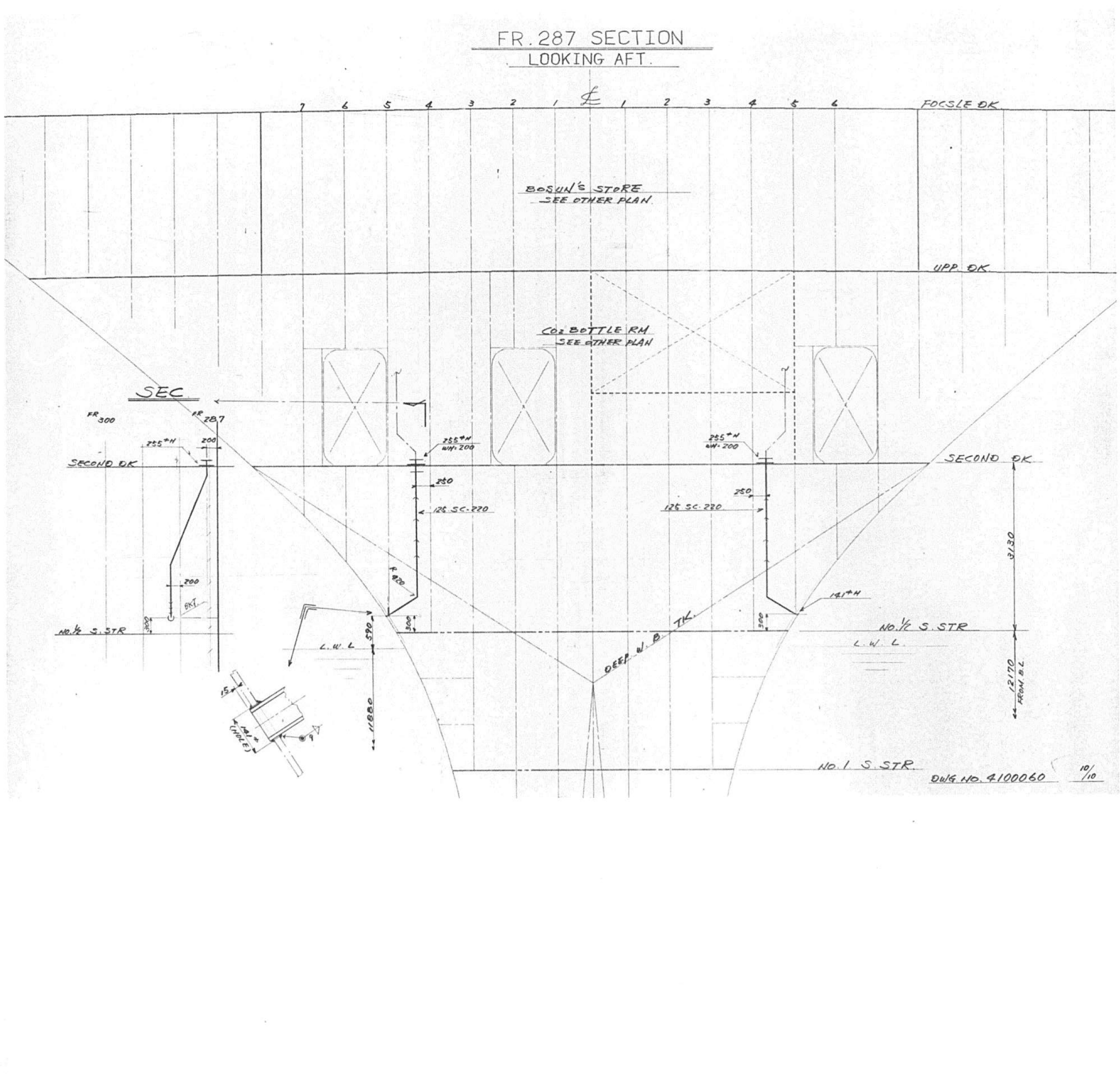
1610


FR 298~296 SECTION
LOOKING AFT.
FOCSLE DK
"A" SEC
UPP DK
SECOND DK
NO. 1/2 S.STR
NO. 1 S.STR
NO. 1 1/2 S.STR
NO. 2 S.STR
B.L.
"a" DET
(OPENING)
SEC
F.P. TK (VOID)
DOPPLER LOG



DWG NO 4100060 9/10

1612


FR. 287 SECTION
LOOKING AFT.
FOCSLE DK
BOSUN'S STORE
SEE OTHER PLAN.
UPP. DK.
CO2 BOTTLE RM
SEE OTHER PLAN
SEC.
SECOND DK
NO.½ S. STR
L.W.L.
DEEP W. B. TK.
NO. 1 S. STR.
DWG. NO. 4100060
10/10

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY 17 '86	LFTS/MES-421			MAY 17 '86	7-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		~~MITSUBISHI KOBE~~	
NO.1323	DOCTOR LYKES	~~NO.1158~~	~~JAMES LYKES~~
NO.1324	ALMERIA LYKES	~~NO.1159~~	~~JOSEPH LYKES~~
NO.1325	TILLIE LYKES	~~NO.1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
SHIP'S NO.
SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC.(PIPING) SEC.CHIEF

船尾水艙内諸管配置
PIPING ARR. IN AFT PEAK TK.

DATE MAR. 25 '85 (TEL 2240)
JOB NO. TS1323/24/25
JOBCLASSIF. NO.
SCALE 1/50
LYKES REF. NO. 480104
MITSUI DRAWING NO. 4100070

(SHEETS WITH COVER)

1/8

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG. NO. 4100070 2/8

GENERAL NOTE

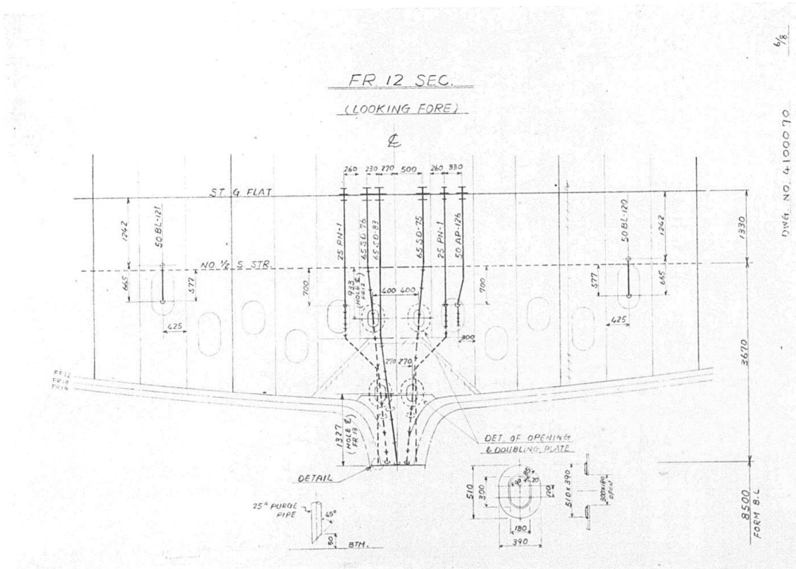
DWG.NO. 4100070 3/8

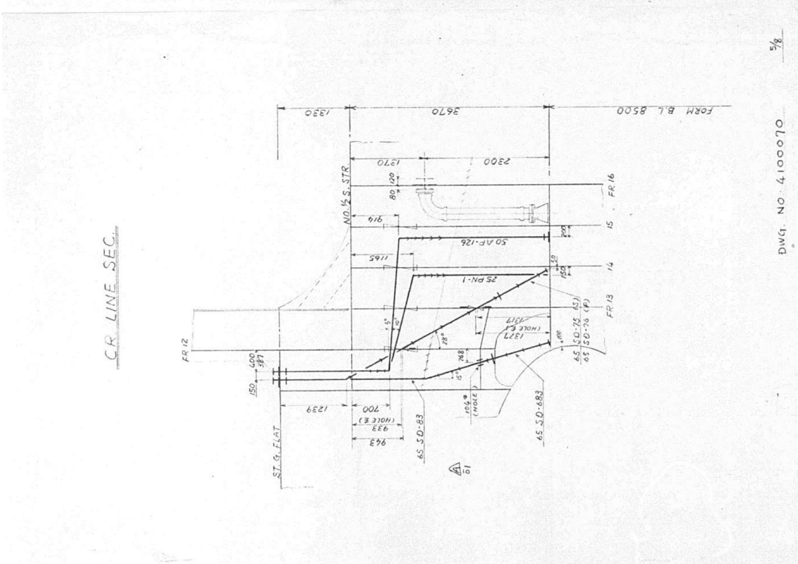
PIPE LIST

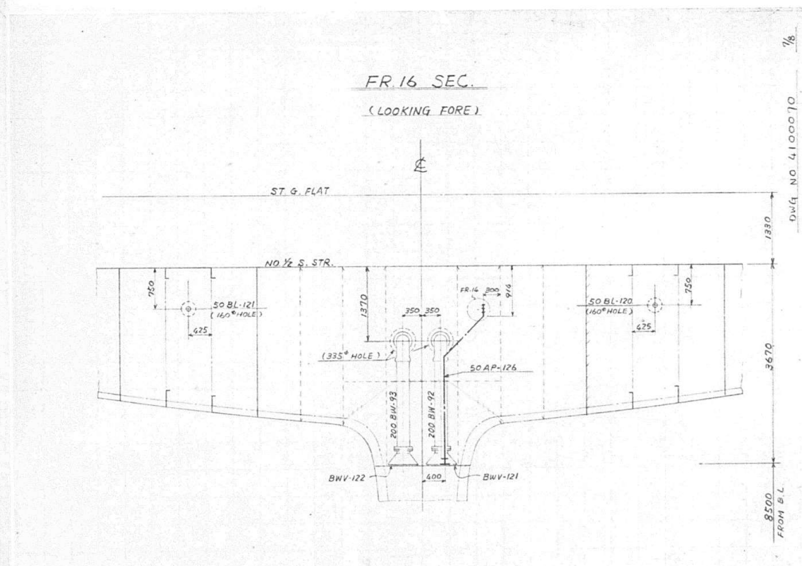
MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

DWG. NO. 4100070 4/8

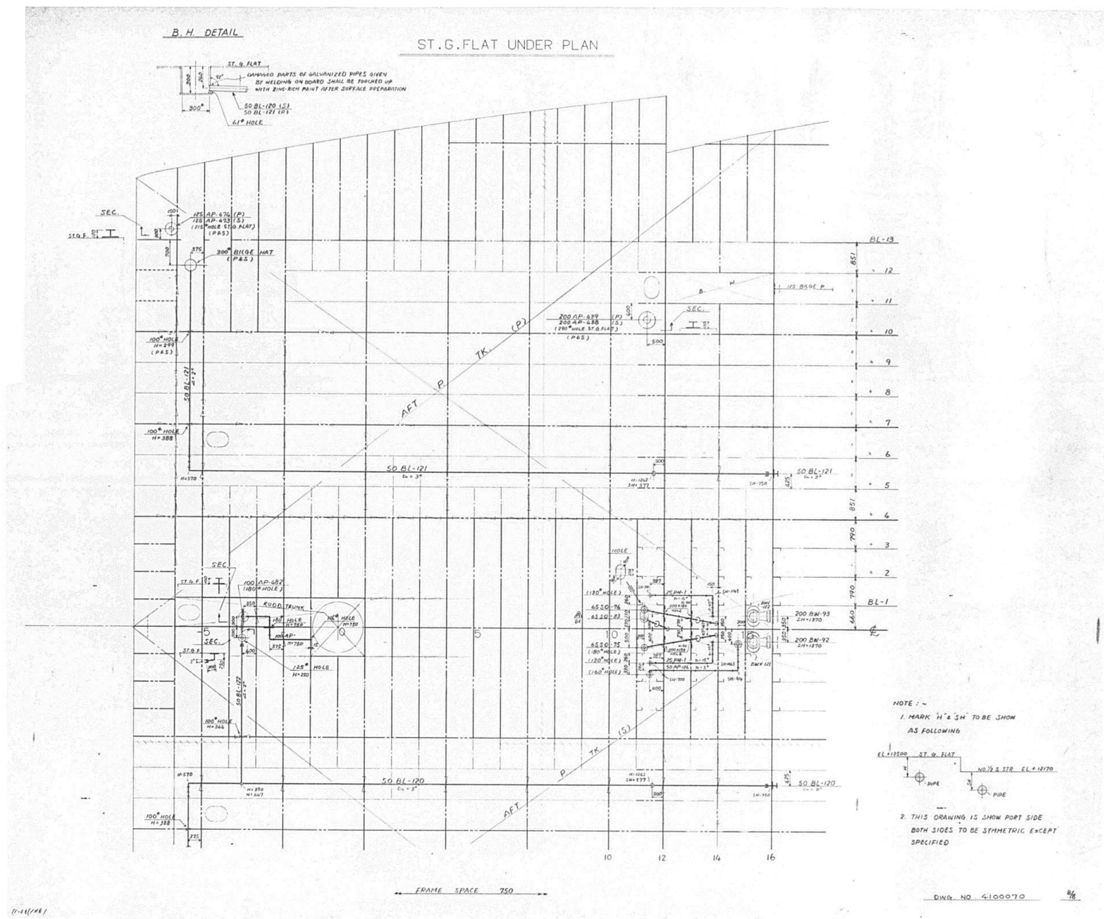
1614


FR 12 SEC.
(LOOKING FORE)
ST. G. FLAT
NO ½ S. STR
50 BL-121
50 BL-120
25 PN-1
65 SD-83
65 SD-75
50 AP-126
DET. OF OPENING & DOUBLING PLATE
DETAIL
25° PURGE PIPE
BTM.
8500 FORM B.L.
DWG. NO. 4100070


CR. LINE SEC.
DWG. NO. 4100070


FR 16 SEC.
(LOOKING FORE)
ST. G. FLAT
NO ½ S. STR.
50 BL-121
50 BL-120
50 AP-126
200 BW-93
200 BW-92
BWV-122
BWV-121
8500 FROM B.L.
DWG. NO. 4100070

1615


B.H. DETAIL
ST.G.FLAT UNDER PLAN
AFT P TK. (P)
AFT P TK. (S)
50 BL-121
50 BL-120
BL-13
BL-1
NOTE : ~
1. MARK "H" & "SH" TO BE SHOW AS FOLLOWING
ST. G. FLAT
PIPE
2. THIS DRAWING IS SHOW PORT SIDE BOTH SIDES TO BE SYMMETRIC EXCEPT SPECIFIED
FRAME SPACE 750
DWG. NO 4100070
8/8

1616

APPROVAL OF OWNER & REGULATORY BODIES								
ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAY 17 '85	OFTS/HES-421	APR. 19, 1985	7-8-2				

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC. (PIPING)
SEC. CHIEF

冷却水艙内諸管配置
PIPING ARRANGEMENT IN COOL. WATER TANK

DATE (TEL 2240)

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25	1/50	480105	4100071

(5 SHEETS WITH COVER)

PLAN RECORD

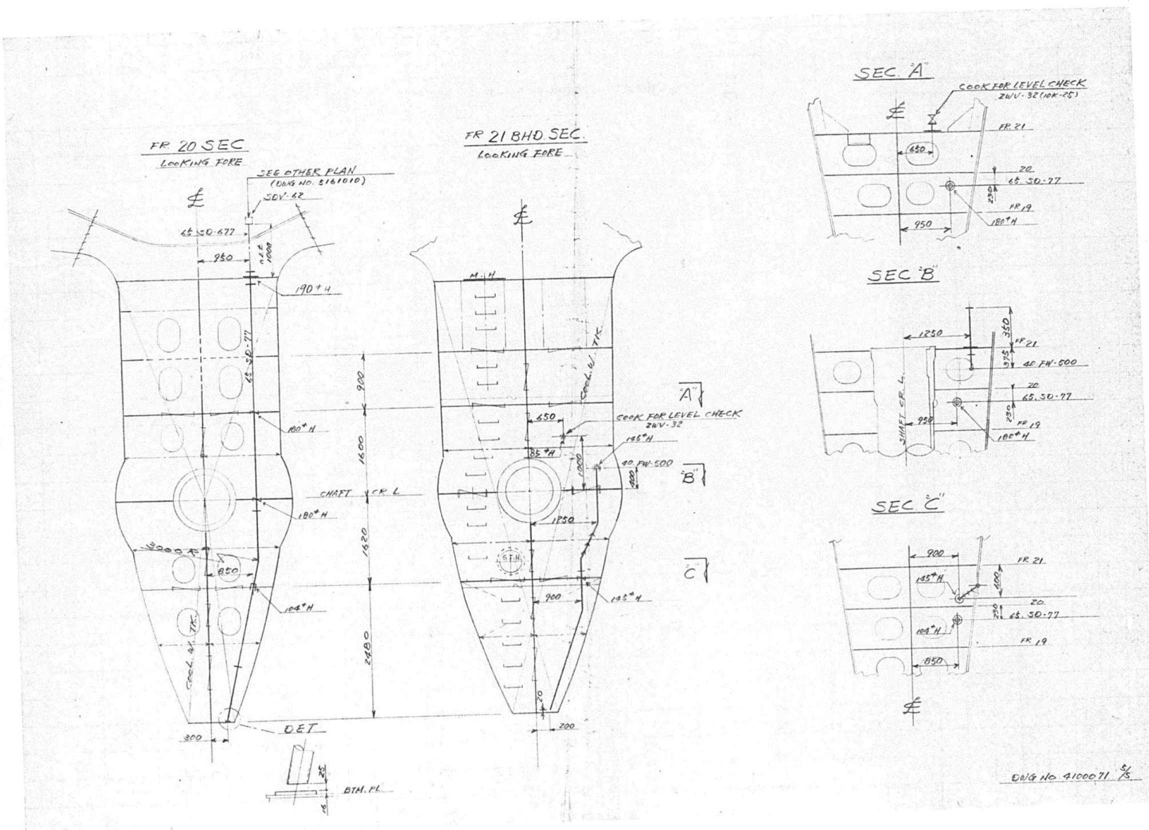
ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

GENERAL NOTE

PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025
FW	FRESH WATER (COOL. W. TK.)	4116201

1617


FR 20 SEC
LOOKING FORE
SEE OTHER PLAN
(DWG NO. 8161010)
FR 21 BHD SEC.
LOOKING FORE
COOK FOR LEVEL CHECK
SHAFT CR. L.
DET
BTM. PL.
SEC "A"
SEC "B"
SEC "C"
FR 21
FR 19
DWG NO 4100071 5/5

1618

APPROVAL OF OWNER & REGULATORY BODIES								
ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	FEB 1985	OFTS/MES/101						

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		~~MITSUBISHI KOBE~~	
NO.1323	DOCTOR LYKES	~~NO.1158~~	~~JAMES LYKES~~
NO.1324	ALMERIA LYKES	~~NO.1159~~	~~JOSEPH LYKES~~
NO.1325	TILLIE LYKES	~~NO.1164~~	~~SOLON TURMAN~~

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: TILLIE LYKES

OUTFIT. DESIGN SEC.(PIPING) SEC.CHIEF

NO.3前後部燃料油艙内管配置

PIPING ARRANGEMENT IN NO.3 FORE AND NO.3 AFT WING. F. O. TK.

DATE MAR 25 '85 (TEL 2240)
JOB NO. TS1323/24/25
JOBCLASSIF.NO.
SCALE 1/50
LYKES REF. NO. 480107
MITSUI DRAWING NO. 4100054

(9 SHEETS WITH COVER)

1/9

PLAN RECORD			
ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	JUNE 2 '86

DWG NO 4100054 2/9

GENERAL NOTE	
1	AIR PURGE TYPE LEVEL GAUGE IS NOT SHOWN.

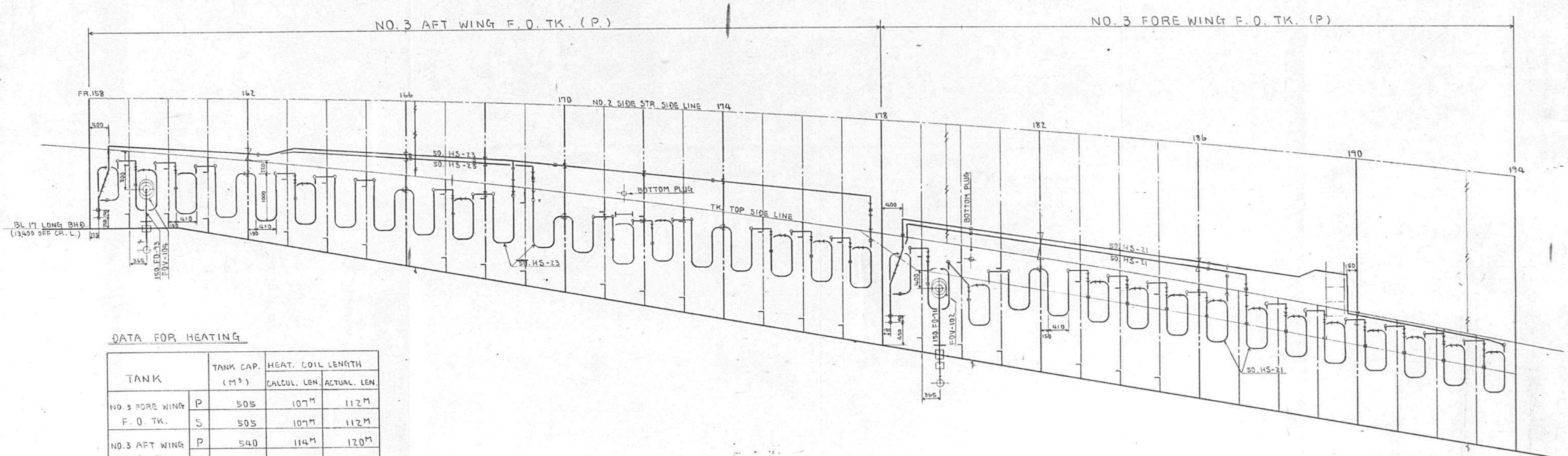
DWG.NO. 4100054 3/9

PIPE LIST

MARK	NAME	DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

DWG NO. 4100054 4/9

1619



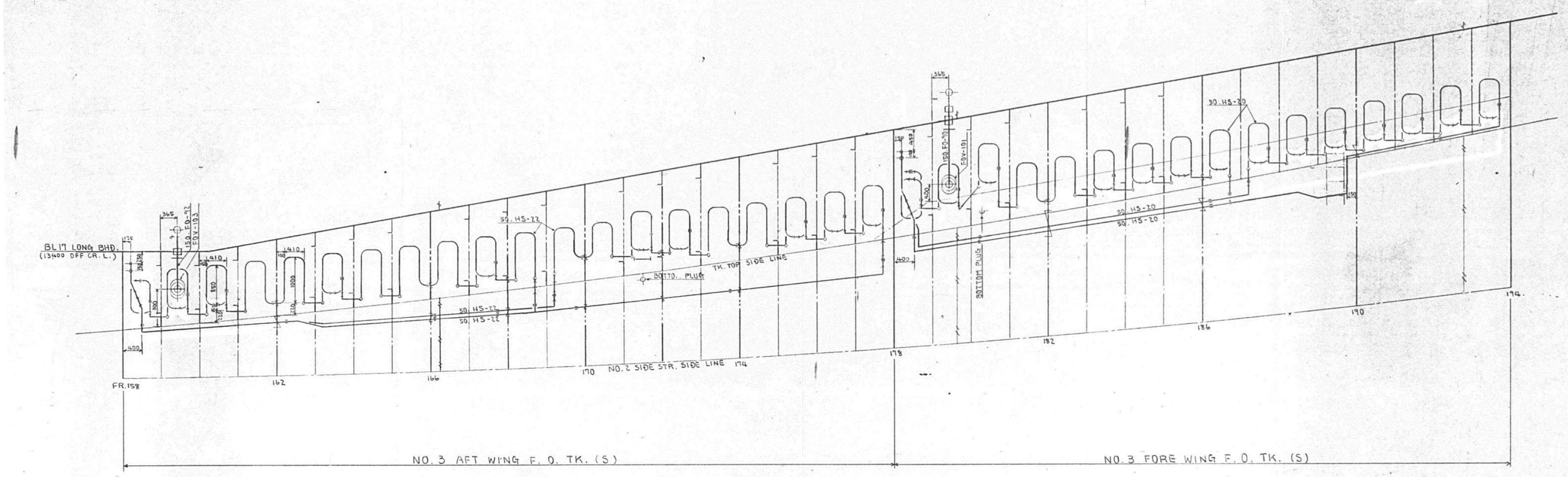
DATA FOR HEATING

TANK		TANK CAP. (M³)	HEAT. COIL LENGTH	
			CALCUL. LEN.	ACTUAL. LEN.
NO. 3 FORE WING F. O. TK.	P	505	107M	112M
	S	505	107M	112M
NO. 3 AFT WING F. O. TK.	P	540	114M	120M
	S	540	114M	120M

DRW. NO. 4100054 5/4

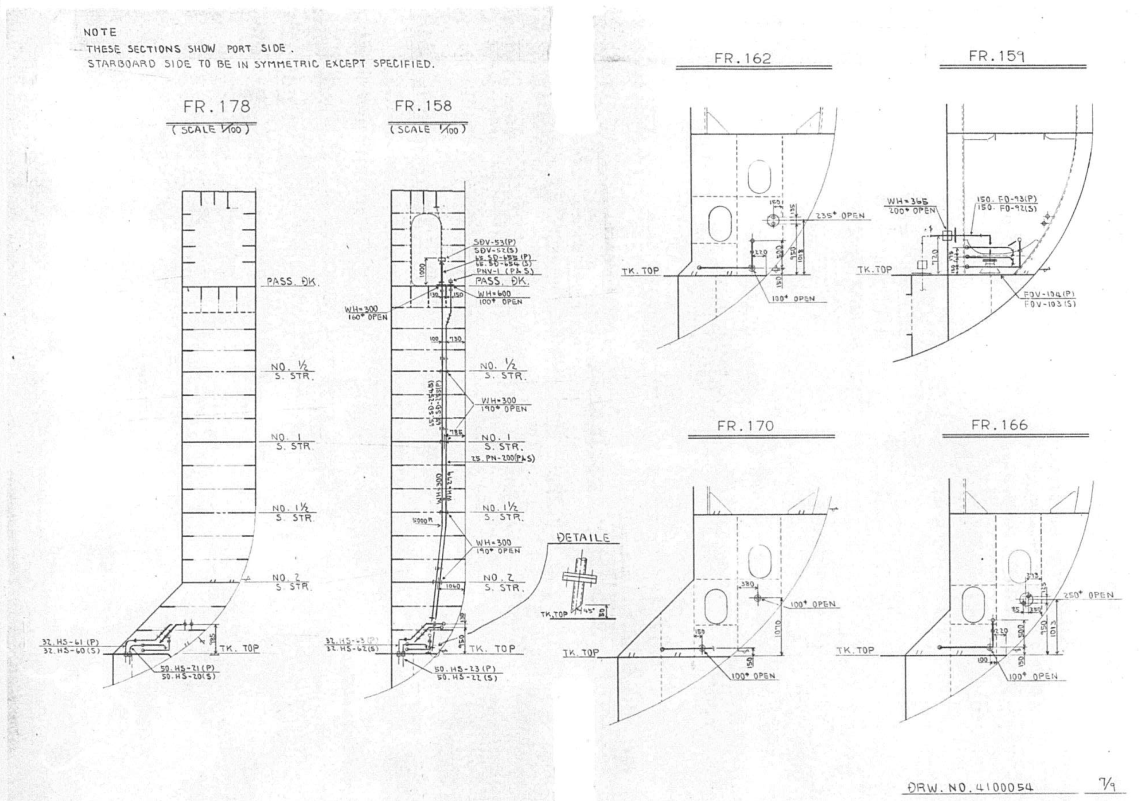
11-5(4)

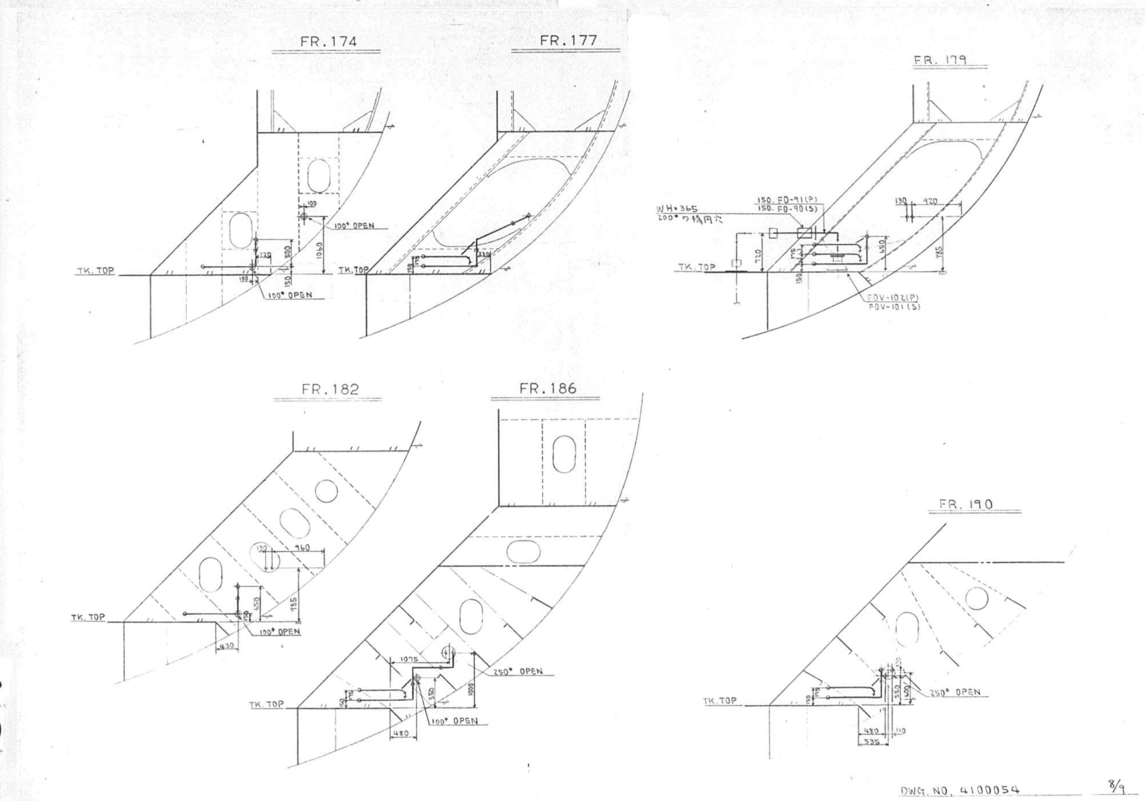
1620



DRW. NO. 4100054 6/9

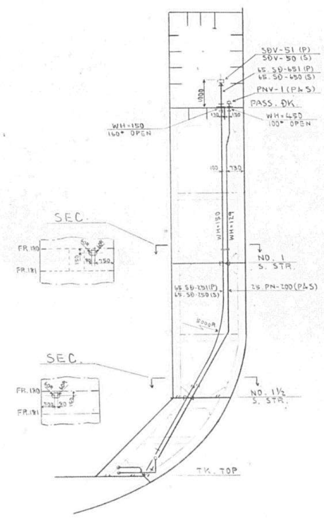
1621


NOTE
THESE SECTIONS SHOW PORT SIDE.
STARBOARD SIDE TO BE IN SYMMETRIC EXCEPT SPECIFIED.
FR. 178
(SCALE 1/100)
FR. 158
(SCALE 1/100)
PASS. DK.
NO. 1/2 S. STR.
NO. 1 S. STR.
NO. 1 1/2 S. STR.
NO. 2 S. STR.
TK. TOP
32. HS-61 (P)
32. HS-60 (S)
50. HS-21 (P)
50. HS-20 (S)
SDV-53 (P)
SDV-52 (S)
PNV-1 (P& S)
WH=600
100° OPEN
WH=300
160° OPEN
WH=300
190° OPEN
25. PN-200 (P&S)
50. HS-23 (P)
50. HS-22 (S)
DETAILE
FR. 162
FR. 159
235° OPEN
100° OPEN
WH=365
200° OPEN
150. FO-93 (P)
150. FO-92 (S)
FOV-104 (P)
FOV-103 (S)
FR. 170
FR. 166
250° OPEN
DRW. NO. 4100054
7/9

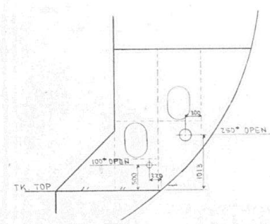

FR. 174
FR. 177
FR. 179
TK. TOP
100° OPEN
WH=365
150. FO-91 (P)
150. FO-90 (S)
FOV-102 (P)
FOV-101 (S)
FR. 182
FR. 186
FR. 190
250° OPEN
200° OPEN
DWG. NO. 4100054
8/9

1622

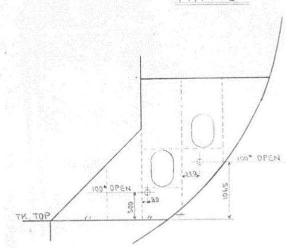
FR. 180
(SCALE 1/100)



FR. 168



FR. 172



DRW. NO. 4100054 9/9

1623

APPROVAL OF OWNER & REGULATORY BODIES						
	OWNER		ABS			
ALT. NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAR. 11 '85	DFTS/HAB/35	APR. 17 '85	T-8-2		
REV. 01	JUL. 18 '85	TAM 41	OCT. 22 '85	T-8-2		
REV. 02	FEB. 2 '87	STAMPED IN DWG.	MAR. 23 '87	T-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER
OUTFIT DESIGN SECT. (PIPING)
SEC. CHIEF

SHIP'S NAME: **TILLIE LYKES**

機関部

給水および復水管系図

FEED & CONDENSATE PIPING
DIAGRAM IN ENGINE ROOM

LYKES REF. NO. 480201 — MITSUI DRAWING NO. 5131001 — REV.

(14 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.No. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S.No. 1324 AND S.No. 1325.	MAR. 26 '87

DWG.NO. 5131001

2

GENERAL NOTE

DWG.NO. 5131001

3

REFERENCE

NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480001	4116002	PIPING PRACTICE
	190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
	482603	4116006	SPECIFICATION AND COMPARISON TABLE (JIS/ASTM) OF BOLTS & NUTS
	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
	482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
	482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
	482608	5131205	GASKET (GENERAL USE)
	482604	5233111	CAST STEEL VALVES
	482606	5233112	FORGED STEEL VALVES
	482607	5233114	BRONZE VALVES

DWG.NO. 5131001

1624

4

REFERENCE			
NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480201	S131001	FEED & CONDENSATE PIPING DIAGRAM IN ENG. RM
	481001	S131002	STEAM AND EXHAUST PIPING DIAGRAM IN ENG. RM
	480802	S131008	STEAM DRAIN PIPING DIAGRAM IN ENG. RM
	481401	S131009	L.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481402	S131012	L.O. TRANSFER & PURIFICATION PIPING DIAGRAM IN ENG. RM
	481501	S131013	F.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481509	S131014	F.O. TRANSFER PIPING DIAGRAM IN ENG. RM
	481502	S131015	F.O. PURIFICATION PIPING DIAGRAM IN ENG. RM
	480403	S131016	COOLING F.W. PIPING DIAGRAM IN ENG. RM
	480601	S131018	COOLING S.W. & S.W. SERVICE PIPING DIAGRAM IN ENG. RM
	480301	S131019	FIRE G.S. & BALLAST PIPING DIAGRAM IN ENG. RM
	480102	S131020	BILGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENG. RM
	480401	S131023	F.W. SERVICE PIPING DIAGRAM IN ENG. RM
	481802	S131024	COMPRESSED AIR PIPING DIAGRAM IN ENG. RM
	481803	S131025	CONTROL AIR PIPING DIAGRAM IN ENG. RM
	481806	S131026	MAIN ENGINE REMOTE CONTROL AIR PIPING DIAGRAM IN ENG. RM
	520001	S131030	EXHAUST GAS PIPING DIAGRAM IN ENG. RM

S131001

DWG. NO. S131001

5

CODED GROUP SYSTEM OF PIPING DIAGRAM

区分 (DIVISION) / 管系 (SYSTEM)	記号および番号 (DIVISION OF SYMBOL NUMBER) 管 (PIPE)	弁.コック.こし器 (VALVE, COCK)
給水管系 FEED WATER	3F-1 ~ 999	3FV-1 ~ 999
復水管系 CONDENSATE	5F-1 ~ 999	5FV-1 ~ 999
開放清水管系 OPEN FRESH WATER DRAIN	6F-1 ~ 999	6FV-1 ~ 999

S131001

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.

SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT
		GATE (SLUICE) VALVE	:BUTT OR SOCKET WELDING ENDED
		BUTTERFLY VALVE	:UNION ENDED
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	
		SCREW DOWN CHECK VALVE	:LOCKED CLOSE :LOCKED OPEN
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE;
		PRESS. REDUCING VALVE DIRECT OPERATING TYPE	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
COCK		TWO-WAY COCK	:LOCKED CLOSE :LOCKED OPEN
		THREE-WAY COCK	
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER
		PISTON TYPE (ON-OFF CONTROL)	:WITH POSITIONER
		PISTON TYPE (OPEN DEGREE CONTROL)	:WITH MANUAL HANDLE
		ELECTRIC MOTOR TYPE	
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	● :WITH STOP VALVE ○ :WITHOUT VALVE :WITH SELF CLOSING VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	
		FLAT GLASS LEVEL GAUGE	
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE;
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	TANK
	L	LEVEL INDICATOR	
	VS	VISCOSITY INDICATOR	
	P	PRESSURE GAUGE	
	C	COMPOUND GAUGE	
	V	VACUUM GAUGE	
	PN	DIFF. PRESS. GAUGE	
	T	THERMOMETER	
	T	REMOTE THERMOMETER	
	F	FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETECTOR	PS	PRESSURE SWITCH	
	TS	TEMPERATURE SWITCH	
	LS	LEVEL (FLOAT) SWITCH	
	FS	FLOW SWITCH	
	SC	SALINITY CELL	
		ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
	MS	MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

KIND	SYMBOL	NAME	REMARK
SAMPLE	---SYMBOL ---INSTRUMENT NO.		
INDICATOR	PI	PRESSURE INDICATOR	
	VI	VACUUM INDICATOR	
	CI	COMPOUND INDICATOR	
		DIFF. PRESS. INDICATOR	
	TI	TEMPERATURE INDICATOR	
	LI	LEVEL INDICATOR	
		VISCOSITY INDICATOR	
	DI	DENSITY INDICATOR	
		SALINITY INDICATOR	
	FI	FLOW INDICATOR	
	XI	OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL	PC	PRESSURE CONTROL	
	TC	TEMPERATURE CONTROL	
	LC	LEVEL CONTROL	
		VISCOSITY CONTROL	
	AC	AUTOMATIC CONTROL	
		EMER. SHUT DOWN	
		EMER. SLOW DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		AUTOMATIC START	
		AUTOMATIC STOP	
		AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM		HIGH PRESSURE ALARM	
		LOW PRESSURE ALARM	
		HIGH DIFF. PRESS. ALARM	
		HIGH TEMPERATURE ALARM	
		LOW TEMPERATURE ALARM	
		TEMP. DEVIATION HIGH ALARM	
		HIGH LEVEL ALARM	
		LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		HIGH VISCOSITY ALARM	
		LOW VISCOSITY ALARM	
		HIGH DENSITY ALARM	
		HIGH SALINITY ALARM	
		OVER FLOW ALARM	
		NON FLOW ALARM	
	XA	GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

5131001

1626

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131001

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
CONDENSATE & FEED PUMP SUC. LINE (5F-1~50)	200	8	216.3	8.2	WELDED CARBON STEEL PIPE STPG 38-E Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 Gr A-E)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G3101) (EQUIVALENT TO ASTM A36)	JIS 10K (143psi)	CAST STEEL FLANGED SC 46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT: STAINLESS STEEL SCS13 JIS G 5121 (EQUIVALENT TO ASTM A351 CF-8) STEM: STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	100°C (212°F)	1K (14PSI)
	150	6	165.2	7.1										
	125	5	139.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC: BC6 (ASTM B62) STEM: SUS 304 (ASTM A276 TP 304)				
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-O JIS H3300 (EQUIVALENT TO ASTM B88 C12200)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC & STEM STAINLESS ST. SUS 304 JIS G4303 (EQUIVALENT TO ASTM A276 TYPE 304)		NAVAL BRASS FLARED JOINT C4641B JIS H3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)		
	6	¼	8.0	1.2										

5131001

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131001

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
HULL TANK AIR VENT LINE (ON EXPOSED DK) GALVANIZED (6F-101~120)	150	6	165.2	11.0	WELDED CARBON STEEL PIPE STPG 38-E Sch.80 JIS G 3454 (EQUIVALENT TO ASTM A53 Gr A)	JIS 10K (143 PSI)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G3101) (EQUIVALENT TO ASTM A36) OR BUTT WELDING OR SLEEVE JOINT	JIS 10K (143PSI)	AIR PIPE HEAD DUCTILE CAST IRON FCD 45 (EQUIVALENT TO ASTM A395)	—	—	—	38°C (100°F)	0K (0 PSi)
	125	5	139.8	9.5										
	100	4	114.3	8.6										
	80	3	89.1	7.6										
	65	2½	76.3	7.0										
	50	2	60.5	5.5										

5131001

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131001

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
FEED PUMP DIS. LINE (3F-1~20)	150	6	165.2	7.1	SCH.160 SEAMLESS CARBON STEEL PIPE ABS-Gr 4 (EQUIV. TO ASTM A106 Gr A)	30K (428psi)	STEEL NECK WELDED FLANGE FORGED STEEL ASTM A105 (3" & OVER)	JIS 30K (428PSI)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT; STAINLESS STEEL SCS 13 JIS G 5121 (EQUIVALENT TO ASTM A351 Gr CF8) STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	JIS 30K (428PSI)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	100°C (212°F)	30K (426PSi)
FEED W. CIRC. PUMP DIS. LINE (3F-21~30)	80	3	89.1	5.5									180°C (356°F)	33K (469PSi)
BOILER W. CIRC. PUMP SUC. LINE (3F-51~60)	65	2½	76.3	7.0	SCH.80		STEEL SOCKET WELDED FLANGE FORGED STEEL ASTM A105 (2½"; ½-2")						193°C	12.5K (178psi)
	50	2	60.5	5.5										
	40	1½	48.6	5.1										
	25	1	34.0	4.5				JIS 40K (568PSI)	FORGED STEEL FLANGED ASTM A105					
BOILER W. CIRC. PUMP DIS. LINE (3F-61~100)	20	¾	27.2	3.9										18K (256PSi)
	15	½	21.7	3.7										
AUX. BOILER BLOW OFF LINE (3F-101~110)	10	⅜	17.3	3.2			FORGED STEEL GRIP JOINT SF50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)		FORGED STEEL SCREWED ASTM A105	DISC & STEM STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)		FORGED STEEL GRIP JOINT SF50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	200°C (392°F)	15.7K (223PSi)
	6	¼	10.5	2.4										
EXH. GAS PRE-ECONOMIZER BLOW OFF LINE (3F-121~150)						40K (568PSi)	STEEL SOCKET WELDED FLANGE FORGED STEEL ASTM A105					—	200°C (392°F)	37.5K (534PSi)

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131001

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
F.W. OPEN DRAIN & AIR VENT LINE GALVANIZED (6F-1~90) (6F-151~200)	200	8	216.3	8.2	WELDED CARBON STEEL PIPE STPG 38-E Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 Gr A-E)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G3101) (EQUIVALENT TO ASTM A36)	—	—	—	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	30°C (86°F)	0K
	150	6	165.2	7.1										
	125	5	139.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
~~HULL TANK AIR VENT LINE (ON EXPOSED DK) GALVANIZED (6F-101~120)~~	40	1½	48.6	3.7										
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-O JIS H 3300 (EQUIVALENT TO ASTM B88 C12200)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	—	—	—		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)		
	6	¼	8.0	1.2										

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SLEEVE JOINT

According to the yard's standard practice,
Welding sleeve joints may be used with the limitation as mentioned hereafter.

1 Piping system to be applied

Exhaust steam line (2E)
~~Steam drain line (5D)~~
~~Exhaust gas line~~
Condensate water line

All air vent line (6F)
All open ended drain line (6F)
~~Open bilge scupper line~~

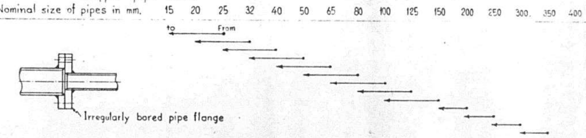
2 Nominal diameter of the pipe
15 mm and over

Reducing method of pipe diameter

In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

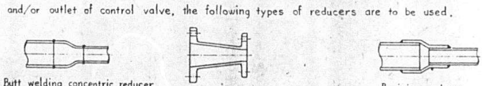
1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the difference of pipe size is within the following limits. → Irregulaly bored pipe flanges shall only be used for vent piping, air piping and scupper pipe line.

Nominal size of pipes in mm. 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400



Irregularly bored pipe flange

2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.



Butt welding concentric reducer. Flange ended reducer Braising reducer

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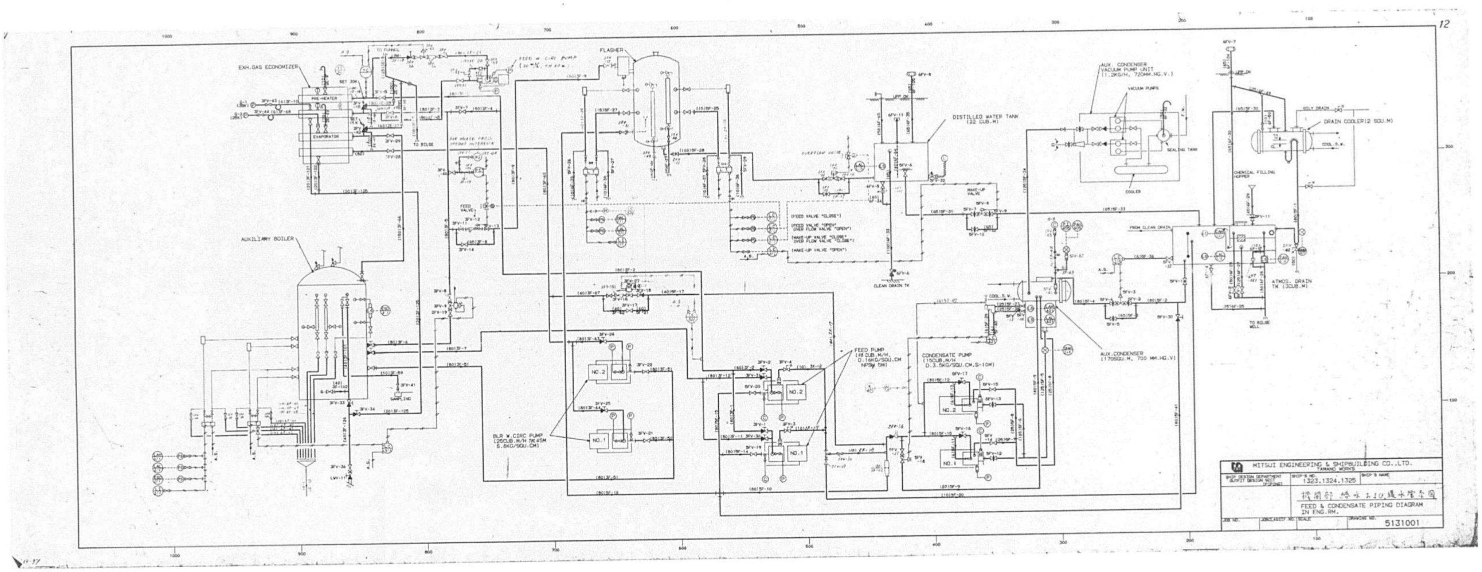
EXH.GAS ECONOMIZER
FLASHER
DISTILLED WATER TANK
AUXILIARY BOILER
FEED PUMP
CONDENSATE PUMP
AUX.CONDENSER
DRAIN COOLER
ATMOS. DRAIN TK
BLR W.CIRC PUMP
MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT
OUTFIT DESIGN SECT (PIPING)
SHIP'S NO.
1323.1324.1325
SHIP'S NAME
FEED & CONDENSATE PIPING DIAGRAM
IN ENG.RM.
JOB NO.
SCALE
DRAWING NO.
5131001

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		ABS		USCG	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	RECEIVED JAN. 10 '85	CFTS/MES-050	FEB. 21 '85	T-8-2	JAN. 21 '85	Ser M-00051
REV. 01	MAY. 22 '85	CFTS/MES-438	MAY. 24 '85	T-8-2	JUN. 10 '85	Ser M-00598

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT
SHIP'S NAME: TILLIE LYKES

機関部
消防およびバラスト管系図

FIRE G.S. & BALLAST PIPING DIAGRAM IN ENGINE ROOM

LYKES REF. NO. 480301
MITSUI DRAWING NO. 5131019

(18 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.No. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S.No. 1324 AND S.No. 1325.	JUN. 26 '86

DWG. NO. 5131019 — 1

GENERAL NOTE

DWG. NO. 5131019 — 2

REFERENCE DRAWING

NO.	REV. NO.	DWG. NO.	DWG. NAME
1		4116101	DIAGRAM OF FIRE & WASH DECK LINE
2		4116201	DIAGRAM OF BILGE, BALLAST AND FUEL OIL LINES
3		5131020	BILGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENGINE ROOM

DWG. NO. 5131019 — 3

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NO.	REF. NO.		DWG. NO.	DWG. NAME
	MES	LIKES		
1		480001	4116002	PIPING PRACTICE
2		190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
3		482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
4		482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
5		482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS.
6		482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
7			5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
8			5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
9			5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
10			5131205	GASKET (GENERAL USE)
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

5131019

CODED GROUP SYSTEM OF PIPING DIAGRAM

管系 (SYSTEM) / 区分 (DIVISION)	記号および番号 (DIVISION OF SYMBOL NUMBER) 管 (PIPE)	弁.コック.こし器 (VALVE, COCK)
ビルジ管系 BILGE	1W-1 ~ 999	1WV-1 ~ 999
バラスト管系 BALLAST	2W-1 ~ 999	2WV-1 ~ 999
消火管系 FIRE	4W-1 ~ 999	4WV-1 ~ 999
排水管系 OPEN BILGE	9W-1 ~ 999	9WV-1 ~ 999

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.

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SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT
		GATE (SLUICE) VALVE	:BUTT OR SOCKET WELDING ENDED
		BUTTERFLY VALVE	·UNION ENDED
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	:LOCKED CLOSE
		SCREW DOWN CHECK VALVE	:LOCKED OPEN
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE;
		PRESS. REDUCING VALVE DIRECT OPERATING TYPE	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
		DUO CHECK VALVE	
COCK		TWO-WAY COCK	:LOCKED CLOSE
		THREE-WAY COCK	:LOCKED OPEN
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER
		PISTON TYPE (ON-OFF CONTROL)	:WITH POSITIONER
		PISTON TYPE (OPEN DEGREE CONTROL)	:WITH MANUAL HANDLE
		ELECTRIC MOTOR TYPE	
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS.-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	● :WITH STOP VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	○ :WITHOUT VALVE
		FLAT GLASS LEVEL GAUGE	:WITH SELF CLOSING VALVE
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE;
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	TANK
		LEVEL INDICATOR	
		VISCOSITY INDICATOR	
		PRESSURE GAUGE	
		COMPOUND GAUGE	
		VACUUM GAUGE	
		DIFF. PRESS. GAUGE	
		THERMOMETER	
		REMOTE THERMOMETER	
		FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETECTOR		PRESSURE SWITCH	
		TEMPERATURE SWITCH	
		LEVEL (FLOAT) SWITCH	
		FLOW SWITCH	
		SALINITY CELL	
		ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
		MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

KIND	SYMBOL	NAME	REMARK
SAMPLE		---SYMBOL ---INSTRUMENT NO.	
INDICATOR		PRESSURE INDICATOR	
		VACUUM INDICATOR	
		COMPOUND INDICATOR	
		DIFF. PRESS. INDICATOR	
		TEMPERATURE INDICATOR	
		LEVEL INDICATOR	
		VISCOSITY INDICATOR	
		DENSITY INDICATOR	
		SALINITY INDICATOR	
		FLOW INDICATOR	
		OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL		PRESSURE CONTROL	
		TEMPERATURE CONTROL	
		LEVEL CONTROL	
		VISCOSITY CONTROL	
		AUTOMATIC CONTROL	
		EMER. SHUT DOWN	
		EMER. SLOW DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		AUTOMATIC START	
		AUTOMATIC STOP	
		AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM		HIGH PRESSURE ALARM	
		LOW PRESSURE ALARM	
		HIGH DIFF. PRESS. ALARM	
		HIGH TEMPERATURE ALARM	
		LOW TEMPERATURE ALARM	
		TEMP. DEVIATION HIGH ALARM	
		HIGH LEVEL ALARM	
		LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		HIGH VISCOSITY ALARM	
		LOW VISCOSITY ALARM	
		HIGH DENSITY ALARM	
		HIGH SALINITY ALARM	
		OVER FLOW ALARM	
		NON FLOW ALARM	
		GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131019

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
BALLAST EDUCTOR DRIVING WATER 2W - 101 ~ 150	200 150 125 100 80	8 6 5 4 3	216.3 165.2 139.8 114.3 89.1	8.2 7.1 6.6 6.0 5.5	WELDED CARBON STEEL PIPE STPG38 E Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED	JIS 16K (228 psi)	STEEL SLIP-ON WELDED FLANGE with hub. FORGED STEEL ASTM A 105 or BUTT WELDING	JIS 16K (228psi)	CAST STEEL FLANGED SC 46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA) OR ASTM A216 WCB	DISC & SEAT; CAST BRONZE BC 6 JIS H5111 (BC 6) OR STAINLESS STEEL SCS 13A JIS G5121 (EQUIVALENT TO ASTM A351 CF8) OR CAST STEEL FACED WITH STAINLESS STEEL STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 16K (228 psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE STPG 38-E Sch 40 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED	38 (100°F)	(11.2*) 159.3+25 = 184.3 (psi) ∴ 13 (185 psi)
	10 6	3/8 1/4	15.0 8.0	1.6 1.2	SEAMLESS DRAWN COPPER PIPE C1220T-O JIS H 3300 (EQUIVALENT TO ASTM B 88 C12200-O)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641 B JIS H3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC 6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC 6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT; CAST BRONZE BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641 B JIS H3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62)		

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MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131019

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
HULL TANK AIR VENT LINE (EXPOSED DECK) 2W - 201 ~ 250	100 80 65 50	 2	114.3 89.1 76.3 60.5	8.6 7.6 7.0 5.5	WELDED CARBON STEEL PIPE STPG 38-E Sch 80 JIS G3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED	JIS 10K (143 psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS 41 JIS G 3101 (EQUIVALENT TO ASTM A36) OR BUTT WELDING OR SLEEVE JOINT (CARBON STEEL PIPE STS 38 (ASTM A106 GrA))	JIS 10K (143 psi)	AIR PIPE HEAD DUCTILE CAST IRON FCD45 (EQUIVALENT TO ASTM A395)		—	—	38 (100°F)	1.0 (15 psi)

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MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131019

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
BALLAST LINE (SUCTION) 2W-1 ~ 50	350 300 250 200 150	14 12 10 8 6	355.6 318.5 267.4 216.3 165.2	9.5 9.5 9.3 8.2 7.1	STAND. (350, 300) Sch 40 (250 ~ 15) WELDED CARBON STEEL PIPE	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL ASTM A 105 OR BUTT WELDING	JIS 10K (143psi)	CAST STEEL FLANGED SC 46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA) OR ASTM A216 WCB OR DUCTILE CAST IRON FLANGED FCD 40 JIS G 5502 (EQUIVALENT TO ASTM A395)	DISC & SEAT; CAST BRONZE BC 6 JIS H5111 (BC 6) OR STAINLESS STEEL SCS13A JIS G5121 (EQUIVALENT TO ASTM A351 CF8) OR CAST STEEL FACED WITH STAINLESS STEEL STEM; STAINLESS STEEL SUS 304 JIS G 4304 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WEDING PIPE TO PIPE STPG 38-E JIS G 3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED	38 (100°F)	1 (14 psi)
BALLAST LINE (PUMP DIS.)	125 100 80 65 50	5 4 3 2½ 2	139.8 114.3 89.1 76.3 60.5	6.6 6.0 5.5 5.2 3.9	STPG 38-E JIS G 3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED	JIS 10K (143 psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G3101) (EQUIVALENT TO ASTM A36) OR BUT WELDING							5 (72 psi)
2W-51 ~ 100	40 32 25 20 15	1½ 1¼ 1 ¾ ½	48.6 42.7 34.0 27.2 21.7	3.7 3.6 3.4 2.9 2.8				JIS 16K (228psi)	CAST BRONZE FLANGED BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	BUTTERFLY V. Ref. to page 13				
	10 6	⅜ ¼	15.0 8.0	1.6 1.2	SEAMLESS DRAWN COPPER PIPE C1220T-O JIS H3300 (EQUIVALENT TO ASTM B 88 C12200-O)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641 B JIS H3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC 6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT; CAST BRONZE BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641 B JIS H3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC 6 JIS H5111 (EQUIVALENT TO ASTM B62)		

5131019

MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131019

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
HULL TANK AIR VENT LINE 2W - 151 ~ 200*	100 80 65	4 3 2½	114.3 89.1 76.3	6.0 5.5 5.2	WELDED CARBON STEEL PIPE STPG38-E Sch 40 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED	JIS 10K (143 psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 JIS G 3101 (EQUIVALENT TO ASTM A36) OR BUTT WELDING OR SLEEVE JOINT (CARBON STEEL PIPE STS 38 (ASTM A106 GrA)) * NOTE EXCEPT 2W-152						38 (100°F)	1.0 (15 psi)
HULL TANK SOUNDING 2W - 301 ~ 350	50	2	60.5	5.5	WELDED CARBON STEEL PIPE STPG38-E Sch 80 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED			—	SOUNDING HEAD CAST BRONZE BC 6 JIS H5111 (EQUIVALENT TO ASTM B62)		—	—		

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MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131019

SYSTEM	NOM. SIZE		PIPE			FLANGE		VALVE & COCK			PIECE		MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
	mm	inch	OUT.DIA mm	THICK mm	MATERIAL	PRESS. STAND	TYPE & MATERIAL	PRESS. STAND	MATERIAL BODY	MATERIAL TRIM	PRESS. STAND	MATERIAL		
SHELL PIECE ATTACHED ON HULL					STEEL PLATE BUILT UP									
	400	16	425	22	P-AAS		STEEL SLIP-ON WELDED FLANGE							
	350	14	370	22	SHELL PAINT OR SEA CHEST PAINT	10K (143psi)	SS41 JIS G 3101							
	300	12	320	22										
	250	10	267.4	21.4	SEAMLESS STEEL PIPE		(EQUIVALENT TO ASTM A36)							
	200	8	216.3	18.2				—	—	—	—	—	38 (100°F)	1 (15 psi)
	150	6	165.2	14.3	STS 38-S JIS G 3455		OR							
	125	5	139.8	12.7			SF 50 A							
	100	4	114.3	11.1	(EQUIVALENT TO ASTM A106 Gr A) SHELL PAINT OR SEA CHEST PAINT		(JIS G 3101 EQUIVALENT TO ASTM A105)							
	80	3	101.6	12.7	SEAMLESS STEEL PIPE									
	65	2½	89.1	12.0	STS 38-S JIS G 3455									
	50	2	76.3	11.0	(EQUIVALENT TO ASTM A106 Gr. A) GALVANIZED									

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5131019

MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131019

SYSTEM	NOM. SIZE		PIPE			FLANGE		VALVE & COCK			PIECE		MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
	mm	inch	OUT.DIA mm	THICK mm	MATERIAL	PRESS. STAND	TYPE & MATERIAL	PRESS. STAND	MATERIAL BODY	MATERIAL TRIM	PRESS. STAND	MATERIAL		
FIRE & WASH DECK LINE					WELDED CARBON STEEL PIPE	JIS 16K (228psi)	STEEL SLIP-ON WELDED FLANGE with hub.		CAST STEEL FLANGED	DISC & SEAT: CAST BRONZE BC 6 JIS H5111 (BC6) OR STAINLESS STEEL SCS 13A JIS G5121 (EQUIVALENT TO ASTM A351 CF8) OR CAST STEEL FACED WITH STAINLESS STEEL	JIS 16K (228 psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE		
	250	10	267.4	9.3					SC 46 or 49					
	200	8	216.3	8.2	STPG 38 E Sch40				JIS G 5101					
	150	6	165.2	7.1	JIS G 3454		FORGED STEEL		(EQUIVALENT			STPG 38-E Sch40		
	125	5	139.8	6.6	(EQUIVALENT TO ASTM A53 Gr A)		ASTM A 105	JIS 16K	TO ASTM A216			JIS G 3454	38	(11.2K) 159.3+25 = 184.3 (psi)
4W-1 ~ 100	100	4	114.3	6.0			or	(228 psi)	WCA OR ASTM A216 WCB)				(100°F)	
	80	3	89.1	5.5			BUTT WELDING					(EQUIVALENT TO ASTM A53 Gr. A)		∴ 13 (185 psi)
	65	2½	76.3	5.2	GALVANIZED					STEM; STAINLESS STEEL SUS 304 JIS G 4303		GALVANIZED		
	50	2	60.5	3.9										
	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	(EQUIVALENT TO ASTM A276 TYPE 304)				
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	3/8	17.3	3.2	SEAMLESS STAINLESS STEEL PIPE SUS 304-TP Sch 80 JIS G 3459 (EQUIVALENT TO ASTM A312 TYPE 304)	JIS 30K (428psi)	FORGED STEEL BITE JOINT ASTM A105	JIS 20K (285 psi)	CAST BRONZE FLARED BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT; CAST BRONZE BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 30K (428 psi)	FORGED STEEL BITE JOINT ASTM A105		
	6	¼	10.5	2.4										

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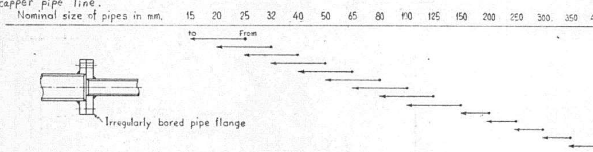
5131019

Reducing method of pipe diameter

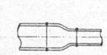
In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the difference of pipe size is within the following limits. → Irregularly bored pipe flanges shall only be used for vent piping, air piping and scapper pipe line.

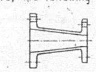


Irregularly bored pipe flange

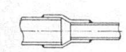
2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.



Butt welding concentric reducer.



Flange ended reducer



Braising reducer

14

5131019

13

MATERIAL OF BUTTERFLY VALVE

1. SEA SUCTION AND OVERBOARD DISCHARGE (ATTACHED ON SHELL) FIRE & BALLAST

BODY	DISC	SEAT RING	REMARKS
CAST STEEL ~~SC46 OR 49 JIS G 5102~~ (~~EQUIVALENT~~ TO ASTM A216 WCB)	STAINLESS STEEL ~~SCS 13A JIS G 5121~~ (~~EQUIVALENT TO~~ ASTM A ~~351~~ 296 Gr CF8)	RUBBER (NBR)	CATEGORY "A" VALVE MATERIAL OF THE VALVES SHALL BE BASED ON SPEC. (E. MACHINERY).

2. MANUAL OPERATED VALVE (2WV-5, 6, 30 & 31) (LOCATED IN ENGINE ROOM EXCEPT ABOVE SEA VALVES)

BODY	DISC	SEAT RING	REMARKS
CAST STEEL SC46 OR 49 (EQUIVALENT TO ASTM A216 WCB)	STAINLESS STEEL SCS 13A JIS 5121 EQUIVALENT TO ASTM A351 Gr CF8	RUBBER (NBR)	MATERIAL OF THE VALVES SHALL BE BASSED ON SPEC. (E. MACHINERY).

3. HYDRAULIC OPERATED VALVE

BODY	DISC	SEAT RING	REMARKS
DUCTILE CAST IRON ~~FCD 40 JIS G 5502~~ (~~EQUIVALENT TO~~ ASTM A395)	~~CAST STEEL~~ STAINLESS STEEL ASTM A296 Gr CF8	RUBBER (NBR)	MATERIAL OF THE VALVES SHALL BE BASED ON SPEC. (D. HULL).

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SLEEVE JOINT

According to the yard's standard practice,
Welding sleeve joints may be used with the limitation as mentioned hereafter.

1 Piping system to be applied

Exhaust steam line
Steam drain line
Exhaust gas line
Condensate water line

—▷ All air vent line (2W-151~250, exception of 2W-152)
—▷ All open ended drain line
Open bilge scupper line

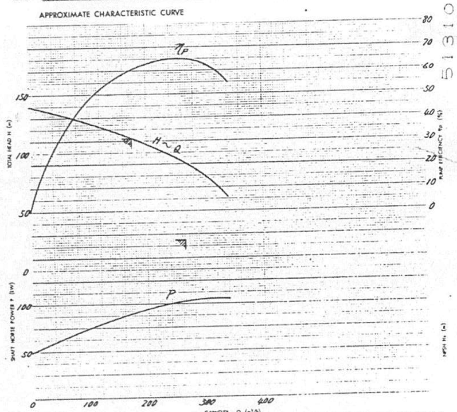
2 Nominal diameter of the pipe
15 mm and over

15

5131019

MESSRS. ________
SHIP No. 1323~1325
NAME FIRE & G. S. PUMP

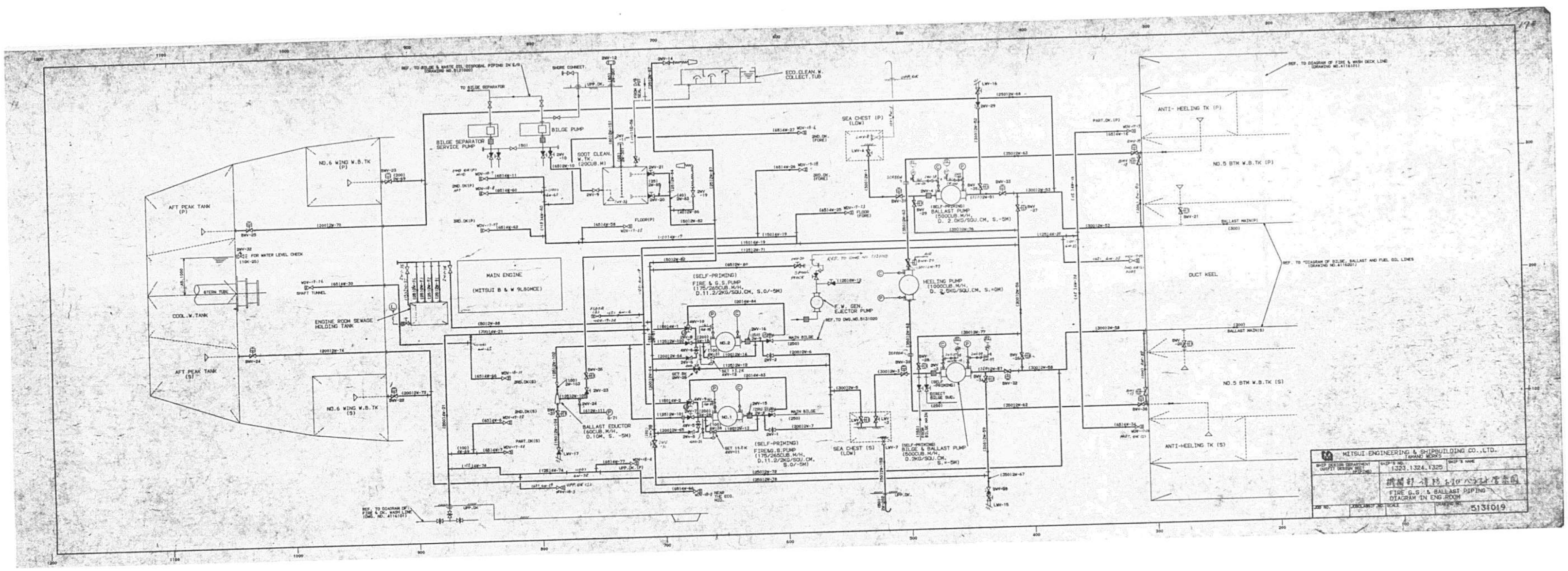
APPROXIMATE CHARACTERISTIC CURVE



PUMP				NORMAL				ORDER NO.	
	CAPACITY	175/265	m³/h		SHAFT HORSE POWER	____	kW	DEPART. HEAD	____
	TOTAL HEAD	112/25	m		PUMP EFFICIENCY	____	%	CHECKED BY	____
	SUCTION HEAD	____	m		NPSH	____	m	DRAWN BY	[signature]
	REVOLUTION	1770	rpm	MAX.	SHAFT HORSE POWER	____	kW	DATE	20th December 1984
	SPECIFIC GR.	____			PUMP EFFICIENCY	____	%		
	LIQUID TEMP	____	°C						
DRIVER	OUT PUT	110	kW	OTHERS	TOTAL HEAD WITH DISCH. V SHUT OFF	____	m	MODEL	GVP200-25
	REVOLUTION	1800	rpm		CAVITATION ZONE	____	m	DRAW. NO.	CP-841225
	VOLTAGE	AC440	V						

SHINKOKINZOKU INDUSTRIES CO., LTD.

1635


AFT PEAK TANK (P)
AFT PEAK TANK (S)
NO.6 WING W.B.TK (P)
NO.6 WING W.B.TK (S)
COOL.W.TANK
ENGINE ROOM SEWAGE HOLDING TANK
MAIN ENGINE
BILGE SEPARATOR SERVICE PUMP
BILGE PUMP
SEA CHEST (P) (LOW)
SEA CHEST (S) (LOW)
(SELF-PRIMING) FIRE & G.S.PUMP
HEELING PUMP
F.W.GEN. EJECTOR PUMP
BALLAST EDUCTOR
BILGE & BALLAST PUMP
ANTI-HEELING TK (P)
ANTI-HEELING TK (S)
NO.5 BTM W.B.TK (P)
NO.5 BTM W.B.TK (S)
DUCT KEEL
MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT
OUTFIT DESIGN SECT.
(PIPING)
SHIP'S NO.
1323,1324,1325
SHIP'S NAME
機関部 消防およびバラスト管系図
FIRE G.S. & BALLAST PIPING
DIAGRAM IN ENG.ROOM
JOB NO.
SCALE
DRAWING NO.
5131019

1636

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY 2 '85	OFTS/MES/395	APR 26 '85	M-00394	MAY 21 '85	T-8-2		
A	JULY 29 '85	OFTS/MES/792	JULY 18 '85	M-00711	AUG. 2 '85	T-8-2		
A1	AUG. 8 '85	OFTS/MES/832	AUG. 12 '85	M-00805	OCT. 3 '85	T-8-2		
A2	SEP. 18 '85	OFTS/MES/912	SEP. 9 '85	M-00957	NOV 21 '85	T-8-2		
A3	FEB 10 '86	OFTS/MES-119/	JAN 23 '86	M-01201	JAN 28 '86	T-8-2		
B	—	—	—	—	—	—		

船主	2
SUP.	1
O.F.	2
USCG(MMT)	4
USCG(本)	1
USCG(OCMI)	
USPH	
ABS(NY)	4
ABS(H.O)	8
ABS(TOK)	2
MHI(神戸)	1R+1
共通控	1
小計	

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC.(PIPING)
SEC.CHIEF
ASSIST. CHIEF ENGR.
STAFF
DATE (TEL 2240)

消火兼甲板洗浄管系統図
及び消火器配置

DIAGRAM OF FIRE & WASH DECK LINE
AND ARRANGE. OF FIRE EXTINGUISHERS

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25 JOBCLASSIF. NO. D.16.01	~	480302	4116101

(64 SHEETS WITH COVER) 1/53

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	June 27 '86

DWG.NO. 4116101 2/53

GENERAL NOTE

1. ALL STEEL PIPES SHALL BE GALVANIZED.
2. WELDED SLEEVE JOINTS SHALL BE USED FOR ALL PIPES WITHIN ACCOMMODATION SPACE IN GENERAL.
3. DAMAGED PARTS OF GALVANIZED PIPES BY WELDING ON BOARD SHALL BE TOUCHED UP WITH ZINC-RICH PAINT AFTER SURFACE PREPARATION.
4. HOSE CONNECTIONS SHALL BE ANSI STANDARD FIRE HOSE THREAD.
5. DRAIN VALVE SHALL BE FITTED AT SUITABLE POSITION OF LOWER PARTS OF FIRE & WASH DECK LINE.
6. REMOTE MANUAL CONTROL (REF. OUR LETTER NO. [illegible])
   1) FIRE CONT. STATION (2ND DECK IN ACC.)
      - NO.1 & 2 FIRE & G.S PUMPS START / STOP
      - FWD. FIRE & G.S. PUMP START / STOP
      - RELEASING OF CO_2 FIRE FIGHTING MEDIA FOR ENG. ROOM.
      - STOPPING OF THE ENGINE ROOM FAN, HOLD FAN AND ACCOMM. FAN
      - FUEL PUMP STOP
      - CLOSING OF THE ENG. SHUT DOWN VALVES OF FUEL OIL TKS.
      - OPENING OF SUCTION AND DISCH. VALVES FOR FIRE USE. ※1)
      - CLOSING OF DAMPERS OF THE ENGINE RM. VENTILATORS.
      - CLOSING OF THE WATERTIGHT SLIDING DOOR OF SHAFT TUNNEL.
   2) FIRE EQUIPMENT ROOM (AROUND THE ENG. CASING ON UPP. DK.)
      - NO.1 & 2 FIRE & G.S PUMPS START/STOP
      - RELEASING OF CO_2 FIRE FIGHTING MEDIA FOR ENG. ROOM.
      - STOPPING OF THE ENGINE ROOM FAN
      - CLOSING OF THE WATERTIGHT SLIDING DOOR OF SHAFT TUNNEL.
      - FUEL PUMP STOP
      - CLOSING OF THE ENG. SHUT DOWN VALVES OF FUEL OIL TKS.
   3) WHEEL HOUSE
      - FWD. FIRE & G.S PUMP START/STOP
      - STOPPING OF THE ENGINE ROOM FAN, HOLD FAN AND ACCOMM. FAN.
      - CLOSING OF THE WATERTIGHT SLIDING DOOR OF SHAFT TUNNEL
      - OPENING OF SUCTION AND DISCH VALVES FOR FIRE USE ※1)
      - FUEL PUMP STOP

DWG.NO. 4116101 3/53

GENERAL NOTE

4) ENGINE CONT. RM.
   - NO.1 & 2 FIRE & G.S. PUMPS START/STOP
   - FWD. FIRE & G.S. PUMPS START/STOP
   - ENGINE ROOM FAN START/STOP
   - CLOSING OF THE WATERTIGHT SLIDING DOOR OF SHAFT TUNNEL
   - OPENING OF SUCTION AND DISCH. VALVES FOR FIRE USE. ※1)

※1) AUTOMATICALLY OPENED BY OPERATING C/C SWITCH FOR FWD. FIRE & G.S. PUMP

DWG.NO. 4116101 4/53

1637

REFERENCE

NO.	REF. NO. MES	REF. NO. LIKES	DWG. NO.	DWG. NAME
1		480001	4116002	PIPING PRACTICE
2		190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
3		482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
4		482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
5		482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS
6		482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER & COPPER NICKEL PIPES
7		482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
8		482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
9		482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
10		482608	5131205	GASKET (GENERAL USE)
11		480301	5131019	FIRE G.S. & BALLAST PIPING DIAGRAM IN ENG. RM.
12	D-58	480101	4116201	DIAGRAM OF BILGE, BALL. & FUEL OIL LINES INCLUDING ANTI-HEELING SYSTEM
13	D-45	260102	4101401	DIAGRAM OF HYD. OIL PIPE FOR DECK MACHINERY
14	D-106	480402	4116401	DIAGRAM OF FRESH, HOT, POTABLE, SEA WATER & STEAM PIPE FOR ACCOMM. USE
15	D-79	930006	4119311	PORTABLE FIRE EXTINGUISHERS
16	D-80	930007	4119312	FIREMAN'S OUTFITS (PROTECTION CLOTH, BOOTS, GLOVES & HAND AXE)
17				
18		482406	5233111	CAST STEEL VALVES
19		482407	5233114	BRONZE VALVES
20		482417	5233107	DUCTILE CAST IRON VALVES
21		482201	4116705	DIAGRAM OF PNEUMATIC PIPES (INC. DRUFT GAUGE SYS.)
22		482610	4116402	DIAGRAM OF REMOTE CONTROL AIR PIPING FOR SEA VALVES IN FWD. MACH. SPACE
23		482432	4116103	REMOTE CONTROL BUTTERFLY VALVE FOR FIRE LINE IN FWD MACH. ROOM
24		720009	6149465	PRESSURE TRANSMITTER
25		720010	6149467	PRESSURE SWITCH
26		482429	4116120	PRESSURE REDUCING VALVE FOR FIRE LINE
27		482430	4116121	PRESSURE CONTROL VALVE FOR FIRE LINE
28		482431	4116122	RELIEF VALVE FOR FIRE LINE
29		480303	4116123	STRAINER FOR FIRE LINE

DWG NO. 4116101 4/53

6

CALCULATION OF FIRE PUMP

A. BILGE PUMP

1) DIAMETER OF MAIN BILGE LINE

ABS RULE (MM)

$d = 25 + 1.68\sqrt{L(B+D)}$

$= 25 + 1.68\sqrt{245 \times (32.2 + 18.8)}$

$\fallingdotseq 212.8$ MM

USCG RULE (INCH) TITLE 46 56.50-50

$d = 1 + \sqrt{\frac{L(B+D)}{2500}}$

$= 1 + \sqrt{\frac{803.81 \times (105.65 + 61.68)}{2500}}$

$\fallingdotseq 8.335$ INCH

$\fallingdotseq 211.71$ MM

d : INTERNAL DIA. OF MAIN BILGE LINE (MM), (INCH)

L : LENGTH ON LOAD WATER LINE --- 245.0 M (803.81 FEET)

B : BREADTH --- 32.2 M (105.65 FEET)

D : DEPTH --- 18.8 M (61.68 FEET)

2) CAPACITY OF BILGE PUMP

ABS RULE

$Q_B = \frac{5.75\, d^2}{1000}$

$= \frac{5.75 \times (212.8)^2}{1000}$

$= 260.4\ M^3/HR$

USCG RULE TITLE 46 56.50-55

$Q_B = \frac{\pi \times d^2}{4 \times (1000)^2} \times 122\ M/MIN. \times 60\ MIN.$

$= \frac{\pi \times (211.71)^2}{4 \times (1000)^2} \times 122 \times 60$

[400 FEET/MIN = 122 M/MIN]

$\fallingdotseq 257.7\ M^3/HR$

Q_B : REQUIRED CAPACITY OF BILGE PUMP (M^3/HR)

B. FIRE PUMP

1) REQUIRED CAPACITY OF FIRE PUMP (Q_F M^3/HR)

ABS RULE

$Q_F = Q_B \times 4/3$

$= 260.4 \times 4/3$

$= 347.2\ M^3/HR$ (TOTAL CAP.)

USCG RULE TITLE 46 95.10-5

$Q_F = Q_B \times 2/3$

$= 257.7 \times 2/3$

$= 171.8\ M^3/HR$ (ONE PUMP CAP.)

2) ACTUAL FIRE PUMP

NO.1 FIRE & G.S. PUMP : 175/265 M^3/HR × T. 11.2/2.5 kg/cm^2 × SUC. 0/-5 M

NO.2 " : 175/265 M^3/HR × T. 11.2/2.5 kg/cm^2 × SUC. 0/-5 M

FWD. " : 175 M^3/HR × T. 8.8 kg/cm^2 × SUC. -5 M

共 (7) 92010-2. A4. ト. 80.000 52.9

三井造船株式会社 DWG NO. 4116101, 5/53

7

CALCULATION OF THE PRESSURE AT FIRE HOSE NOZZLE

1. REQUIRED PRESSURE AT HIGHEST HYDRANTS NOZZLE BY USCG RULE

3.5 kg/cm^2 (APPROX. 50 psi) ---- AT LEAST 2 JETS ARE USED

2. FLOW CAPACITY FROM ONE (1) NOZZLE

$Q_N = K\sqrt{P}$

WHERE

Q_N : FLOW CAPACITY FROM NOZZLE (GPM)

K : CONSTANT

{ 5/8" NOZZLE --- K = 11.70 (FOR INTERIOR LOCATIONS)
{ 7/8" NOZZLE --- K = 22.78 (FOR EXTERIOR LOCATIONS)

P : PRESSURE (psi)

5/8" NOZZLE

$Q_N = 11.70\sqrt{50}$

$\fallingdotseq 82.74$ GPM

$\fallingdotseq 19\ M^3/HR$

7/8" NOZZLE

$Q_N = 22.78\sqrt{50}$

$\fallingdotseq 161.1$ GPM

$\fallingdotseq 36.9\ M^3/HR$

共 (7) 92010-2. A4. ト. 80.000 52.9

三井造船株式会社 DWG NO. 4116101, 6/53

8

CASE 1 : NO. OF DISCHAGE HYDRANTS --- TWELVE (12) NOZZLES

REQUIRED DISCH. CAP. OF NOZZLES { SIX (6) 7/8" NOZZLES (FIRE HYDRANT STATION NO. 1, 2, 5, 6, 15 & 16) --- (ONE FLOW CAP.) 37 M^3/HR × 6 = 222 M^3/HR
FOUR (4) 5/8" NOZZLES (FIRE HYDRANT STATION NO. 3, 4, 7 & 8) --- (ONE FLOW CAP.) 19 M^3/HR × 4 = 76 M^3/HR

REMAINING QUAN. { TWO (2) 7/8" NOZZLES (FIRE HYDRANT STATION NO. 17 & 18) --- (ONE FLOW CAP.) 26 M^3/HR × 2 = 52 M^3/HR

TOTAL CAP. 350 M^3/HR

DRIVE 2 PUMPS	NO.1 AND NO.2 FIRE & G.S. PUMPS IN ENGINE ROOM														
DISCHAGE HYDRANTS	NO.1 ~ NO.8, NO.15 ~ NO.17 & NO.18														
PRESSURE CALCULATION POINT	FIRE HYDRANT STATION NO.1														
MARK OF LINE	a			b		c				d	e				f
PIPE SIZE (NOMI. DIA.)	300	200	250	150	200	200	150	150	150	THE SAME AS ⓒ	150	125	100	65	THE SAME AS ⓔ
EQUIV. LENGTH TO PIPE (M)	55	21	37	100	98	99	262	55	20		64	9	11	33	
FLOW CAPACITY (M^3/HR)	350	175	175	175	350	175	175	149	112		112	93	56	37	
FRICTIONAL HEAD LOSS (M)	0.35	0.27	0.16	5.4	4.84	1.27	14.15	2.16	0.46		1.45	3.72	0.47	6.16	

$P_1 = P_P - P_f - H - P_R$

$= 112 - (0.35 + 0.27 + 0.16 + 5.4 + 4.84 + 1.27 + 14.15 + 2.16 + 0.46 + 1.45 + 3.72 + 0.47 + 6.16) - (32.14 + 3.76 - 8) - 3$

$= 40.24$ M

$\therefore P_1 = 4.0\ kg/cm^2$

WHERE

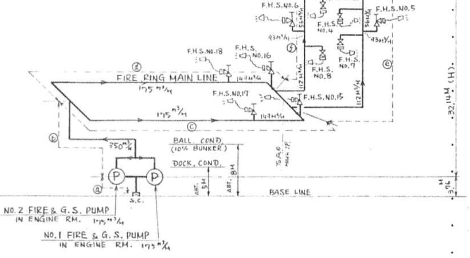
P_1 : PITOT TUBE PRESSURE OF FIRE HYDRANT STATION NO.1

P_P : DISCHARGE PRESSURE OF FIRE PUMP (M)

P_f : FRICTIONAL HEAD LOSS OF PIPE LINE (M)

H : STATIC HEAD LOSS (M)

P_R : PRESSURE DROP AT FIRE HOSE (M)



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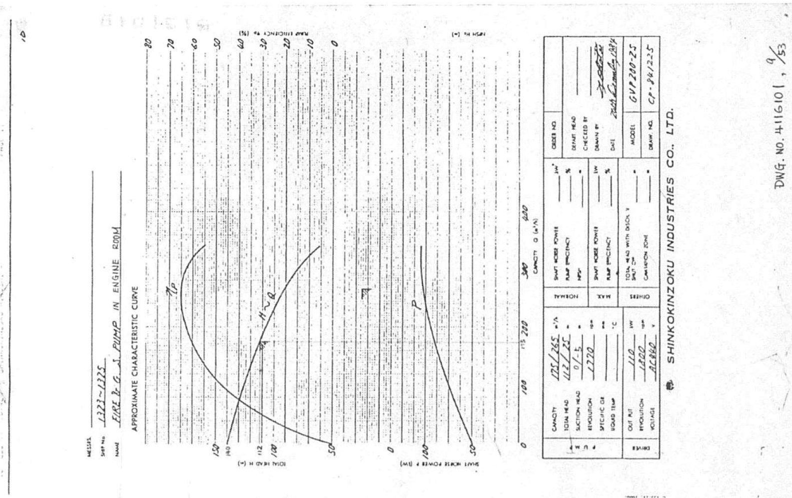
三井造船株式会社 DWG NO. 4116101, 7/53

DWG. NO. 4116101, 9/53



STEEL PIPE --- 4216191
STEEL FLG. --- 4216260
REDUCER --- 4216262

PIPING LIST (1/3)

SYSTEM (SERVICE)		MAX. WORK. PRESS. (kg/cm²)	WORK. TEMP. (°C)	HYD. TEST PRESS. (kg/cm²)	PIPE									JOINT			USCG PIPING CLASS	AB PIPING CLASS
					MATERIAL		LIST NO. STANDARD		NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS STD.	TYPE	MATERIAL		
FIRE & WASH DK. LINE (ON EXPOSED DK)	SEA WATER	13	38	WORK. PRESS	CARBON STEEL PIPE STPG38-E JIS G 3454 (EQUIVALENT TO ASTM A53 Gr. A-E)	GALVANIZED	WD-100-109	101	200	8	216.3	8.2	40	16 kg/cm²	BUTT WELDED JOINT, WELDED SLEEVE JOINT OR STEEL SLIP-ON WELDED FLANGE	BUTT WELDED JOINT: STEEL JIS G 3456 STPT 42 (EQUIV. TO ASTM A106 Gr. B) OR WELDED SLEEVE JOINT: CARBON STEEL PIPE JIS G 3455 STS38-S (EQUIV. TO ASTM A106 Gr. A) OR 16kg/cm² STEEL SLIP-ON WELDED FLANGE: STEEL JIS G3201 SF50A (EQUIV. TO ASTM A105)	II	II
							WD-110-119	111	150	6	165.2	7.1	40					
							WD-10-19	10	100	4	114.3	6.0	40					
							WD-30-59	53	65	2½	76.3	5.2	40					
Do. (IN ACCOMM.)							WD-319	319				11.0	80					
							WD-310-318	311	150	6	165.2	7.1	40					
							WD-209	209				9.5	80					
							WD-201-208	203	125	5	139.8	6.6	40					
							WD-210-219	212	100	4	114.3	6.0	40					
							WD-259	259				7.0	80					
							WD-230-258	240	65	2½	76.3	5.2	40					
							- -											
Do. (IN MACHINERY SPACE, STORE, HOLD & ETC.)							WD-480-489	481	40	1½	48.	3.7	40					
							WD-500-509	502	200	8	216.3	8.2	40					
							WD-510-519	511	150	6	165.2	7.1	40					
							WD-401-409	401	125	5	139.8	6.6	40					
							WD-410-419	412	100	4	114.3	6.0	40					
					(SEE REF. NO. 8)		WD-420-429	420	80	3	89.1	5.5	40		(SEE REF. NO. 4)			
							WD-430-469	459	65	2½	76.3	5.2	40					
		13		WORK PRESS.			WD-530-539	530	200	8	216.3	8.2	40					
							WD-540-549	540	100	4	114.3	6.0	40					
							WD-550-559	550	80	3	89.1	5.5	40					

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CASE 2 : NO. OF DISCHAGE HYDRANTS --- SIX (6) 7/8" NOZZLES

(REQUIRED DISCH. CAP. OF NOZZLES) FOUR (4) 7/8" NOZZLES (FIRE HYDRANT STATION NO. 26, 27, 41 & 42) --- (ONE FLOW CAP.) 37 M³/HR × 4 = 148 M³/HR
(REMAINING QUAN.) TWO (2) 7/8" NOZZLES (FIRE HYDRANT STATION NO. 23 & 24) --- (ONE FLOW CAP.) 13.5 M³/HR × 2 = 27 M³/HR
TOTAL CAP. 175 M³/HR

DRIVE ONE PUMP	FWD. FIRE & G. S. PUMP IN FWD MACHINERY SPACE												
DISCHAGE HYDRANTS	NO. 23, NO. 24, NO. 26, NO. 27, NO. 41 & NO. 42												
PRESSURE CALCULATION POINT	FIRE HYDRANT STATION NO. 41												
MARK OF LINE	g	h	i	j	c				d	k	l	m	n
PIPE SIZE (NOMI. DIA.)	200	200	200	THE SAME AS (?)	150	150	150	200	THE SAME AS (○)	200	THE SAME AS (?)	65	65
EQUIV. LENGTH TO PIPE (M)	61	118	24		248	66	23	99		38		27	33
FLOW CAPACITY (M³/H)	175	175	87.5		87.5	74	37	37		37		37	37
FRICTIONAL HEAD LOSS (M)	0.99	1.52	0.09		3.48	0.68	0.07	0.1		0.04		5.04	6.16

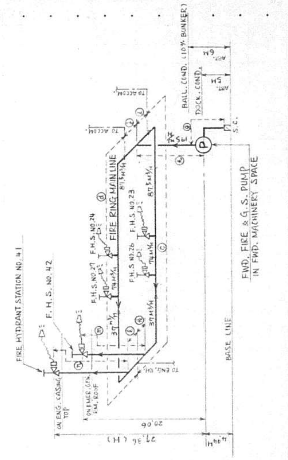
$P_{41} = P_P - P_f - H - P_K$

$= 88 - (0.99 + 1.52 + 0.09 + 3.48 + 0.68 + 0.07 + 0.1 + 0.04 + 5.16) - (27.36 + 4.04 \cdot 6) - 3$

$= 46.85\ M$

$\therefore P_{41} = 4.6\ kg/cm^2$

WHERE
P_{41} : PITOT TUBE PRESSURE OF FIRE HYDRANT STATION NO. 41
P_P : , P_f : , H : , P_K : SEE PAGE 9/53



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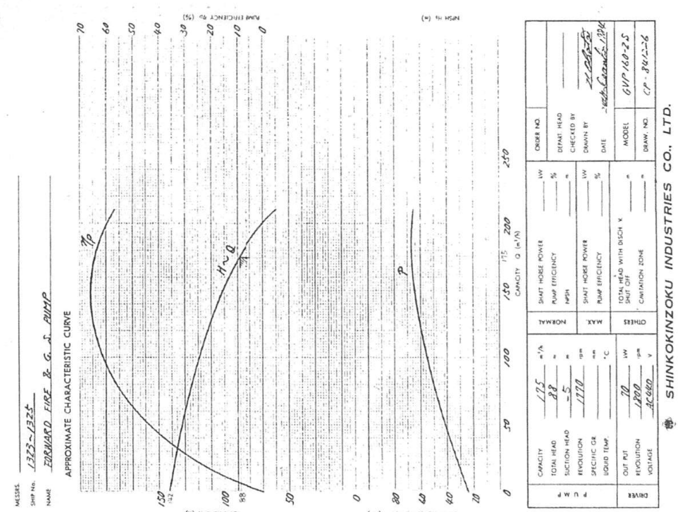

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1639

PIPING LIST (3/3)

COPPER PIPE : № 4216190
FLARE JOINT : № 4216135

SYSTEM (SERVICE)		MAX. WORK. PRESS (kgf/cm^2)	WORK. TEMP. (°C)	HYD. TEST PRESS	PIPE MATERIAL		LIST NO. STANDARD	LIST NO. ACT.	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
CONTROL AIR LINE FOR REMOTE CONTROL	CONTROL AIR	8.4 (119PSI)	30	WORK. PRESS	WELDED CARBON STEEL PIPE STPG 38-E JIS G 3454 (EQUIVALENT TO ASTM A53 Gr. A-E)	GALVANIZED	CA-900-905	901	15	1/2	21.7	2.8	40	JIS 10K (143PSI)	WELDED SLEEVE JOINT OR STEEL SLIP-ON WELDED FLANGE [SEE REF. NO 4]	WELDED SLEEVE JOINT: CARBON STEEL PIPE JIS G 3455 STS 38-S (EQUIV. TO ASTM A106 Gr. A) OR 10 kgf/cm^2 STEEL SLIP-ON WELDED FLANGE: STEEL JIS G 3101 SS41 (EQUIV. TO ASTM A36)	II	II
							- -				.	.						
							- -				.	.						
							- -				.	.						
							- -				.	.						
							- -				.	.						
							- -				.	.						
							- -				.	.						
							- -				.	.						
					SEEMLESS COPPER PIPE C 1220 T-O JIS H 3300 (EQUIVALENT TO ASTM B88 C 12200)	-	CA-906-910	908	10	3/8	15.0	1.6	-		BRASS FLARED JOINT [SEE REF. NO 6]	C 3604 JIS H 3250 (EQUIV. TO ASTM B16)		
							CA-920-925	921	6	1/4	8.0	1.2	-					
							CA-926-930	927	4	1/8	6.0	1.0	-					
							- -				.	.						
							- -				.	.						
PRESSURE SENSING LINE	SEA WATER	13	38		SEAMLESS STAINLESS STEEL PIPE SUS 304-TP JIS G 3459 (EQUIV. TO ASTM A312 TYPE 304)	-	WD-990-995	991	10	3/8	17.3	3.2	80	JIS 30K (427PSI)	THREADED COUPLING OR SOCKET WELD COUPLING OR GRIP TYPE JOINT	JIS SUS316 (EQUIV. TO ASTM A276-316)		
							WD-996-999	996	6	1/4	10.5	2.4	80					
							- -				.	.						
							- -				.	.						
							- -				.	.						

DWG. NO. 4116 101 15/53

FITTING LIST (2/6)

SYMBOL	TYPE	SERVICE	PRESS. RATE	MAX. WORK. PRESS. (kgf/cm^2)	WORK. TEMP. (°C)	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
	GLOBE HOSE VALVE	SEA WATER	16	13	38	CAST BRONZE BC 6 JIS H 5111 (EQUIV. TO ASTM B62)	STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	CAST BRONZE BC 6 JIS H 5111 (EQUIV. TO ASTM B62)	65	2½	29	WDV-17-1~29	SEE PAGE 30/53 № 4216111
	ANGLE HOSE VALVE								65	2½	23	WDV-16-1~23	SEE PAGE 31/53 № 4216111
									65	2½	8	WDV-18-1~4, 18-6~8, 18-11	
	GLOBE HOSE VALVE FOR INTERNA. SHORE CONNEC.								65	2½	2	WDV-20-1~2	SEE PAGE 31/53 № 4216111
	ANGLE VALVE		10	7		DUCTILE CAST IRON FCD45 JIS G 5502 (EQUIV. TO ASTM A395)			50	2	2	WDV-21-1~2	SEE PAGE 32/53 № 4216120
	PRESSURE CONTROL VALVE		16	13		CAST STEEL SCPH 2 JIS G 5151 (EQUIV. TO ASTM A216 Gr. WCB)		STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	100	4	1	WDV-11	SEE REF. NO 27 № 4216123
	GLOBE VALVE		16	13		CAST BRONZE BC 6 JIS H 5111 (EQUIV. TO ASTM B62)		CAST BRONZE BC 6 JIS H 5111 (EQUIV. TO ASTM B62)	40	1½	2	WDV-26-1~2	SEE PAGE 32/53-2 № 4216112
	GLOBE VALVE		10	7.5		DUCTILE CAST IRON FCD 45 JIS G 5502 (EQUIV. TO ASTM A395)			65	2½	1	WDV-27	SEE PAGE 32/53-1 № 4216120
	GLOBE VALVE		20	13		CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)	STAINLESS STEEL SUS304 JIS G4303 (EQUIV. TO ASTM A276 TYPE 304)	CAST BRONZE BC6 JIS H 5111 (EQUIV. TO ASTM B62)	6	1/4	1	WDV-71	№ 4216155
									6	1/4	3	WDV-72	
	PRESSURE GAUGE		16	13		BOURDON TUBE: STAINLESS STEEL SUS316 JIS G 4303 (EQUIV. TO ASTM A182 Gr. F316)	—	—	–	½"×4"φ	1	WDV-73	№ 4216154

DWG. NO. 4116 101 14/53

PIPING LIST (2/3)

SYSTEM (SERVICE)		MAX. WORK. PRESS (kgf/cm^2)	WORK. TEMP. (°C)	HYD. TEST PRESS (kgf/cm^2)	PIPE MATERIAL		LIST NO. STANDARD	LIST NO. ACT.	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
SUCTION LINE FOR FWD. FIRE & G.S. PUMP	SEA WATER	1	38	WORK. PRESS	CARBON STEEL PIPE STPG 38-E JIS G 3454 (EQUIVALENT TO ASTM A53 Gr. A-E)	GALVANIZED	WD-700-709	700	200	8	216.3	8.2	40	10	BUTT WELDED JOINT, WELDED SLEEVE JOINT OR STEEL SLIP-ON WELDED FLANGE	BUTT WELDED JOINT: STEEL JIS G 3456 STPT42 (EQUIV. TO ASTM A106 Gr. B) OR WELDED SLEEVE JOINT: CARBON STEEL PIPE JIS G 3455 STS 38-S (EQUIV. TO ASTM A106 Gr. A) OR 10 kgf/cm^2 STEEL SLIP-ON WELDED FLANGE: STEEL JIS G 3101 SS41 (EQUIV. TO ASTM A36) OR 16 kgf/cm^2 STEEL SLIP-ON WELDED FLANGE: STEEL JIS G 3201 SF 50A (EQUIV. TO ASTM A105)	II	II
							WD-610-619	611	100	4	114.3	6.0	40					
							WD-620-629	620	80	3	89.1	5.5	40					
Do. (SHELL PIECE)					CARBON STEEL PIPE STS 38-S JIS G 3455 (EQUIVALENT TO ASTM A106 Gr.A SEAMLESS)		WD-710-719	710	200	8	216.3	18.2	120					
							- -				.	.						
							- -				.	.						
SEA WATER GENERAL SERVICE LINE (ON EXPOSED DK.)		7		WORK PRESS	CARBON STEEL PIPE STPG 38-E JIS G 3454 (EQUIVALENT TO ASTM A53 Gr. A-E)		WD-870-879	871	50	2	60.5	3.9	40					
							- -				.	.						
							- -				.	.						
Do. IN MACHINERY SPACE							WD-901-909	901	125	5	139.8	6.6	40					
							WD-920-929	920	80	3	89.1	5.5	40					
							WD-930-959	932	65	2½	76.3	5.2	40					
							WD-960-969	963	50	2	60.5	3.9	40					
							WD-980-989	981	25	1	34.0	3.4	40					
							- -				.	.						
FIRE & WASH DK. LINE (IN HANDL. SPACE)		13		WORK PRESS	(SEE REF. NO. 8)		WD-560-569	560	150	6	165.2	7.1	80	16 kgf/cm^2	(SEE REF. NO. 4)			
							WD-570-579	570	125	5	139.8	6.6	80					
							- -				.	.						
							- -				.	.						

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FITTING LIST (1/6)

SYMBOL	TYPE	SERVICE	PRESS. RATE (kgf/cm^2)	MAX. WORK. PRESS. (kgf/cm^2)	WORK. TEMP. (°C)	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
	PISTON TYPE (ON-OFF CONT.) REMOTE CONTROL BUTTERFLY VALVE	SEA WATER	10	1	38	CAST STEEL SC49 JIS G 5101 (EQUIV. TO ASTM A216 Gr. WCB)	STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A182 TYPE 304)	200	8	1	WDV-1	SEE REF. NO. 23 № 4216133 (OPEN/SHUT INDICATOR TO BE PROVIDED)
			16	13					200	8	1	WDV-2	№ 4216133
									125	5	1	WDV-3	
	GATE VALVE					CAST STEEL SC49 JIS G 5101 (EQUIV. TO ASTM A216 Gr. WCB)		CAST STEEL SC49 JIS G 5101 (EQUIV. TO ASTM A216 Gr. WCB)	200	8	4	WDV-4-1~4	SEE PAGE 26/53 № 4216122
								STAINLESS STEEL CASTING JIS G 5121 SCS 13 A (EQUIV. TO ASTM A351 CF8)	150	6	4	WDV-5-1~4	SEE PAGE 27/53 № 4216122
	SWING CHECK VALVE			14.2		CAST STEEL SC49 JIS G 5101 (EQUIV. TO ASTM A216 Gr. WCB)	—	STAINLESS STEEL SCS 13A JIS G 4303 (EQUIV. TO ASTM A351 CF8)	200	8	1	WDV-7	SEE PAGE 28/53-1 № 4216121
				13					65	2½	2	WDV-8-1~2	SEE PAGE 28/53 № 4216121
	SCREW DOWN STOP CHECK GLOBE VALVE (NORMAL CLOSE)		10	7.5		CAST STEEL SC49 JIS G 5101 (EQUIV. TO ASTM A216 Gr. WCB)	STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	STAINLESS STEEL CASTING SCS13 JIS G 5121 (EQUIV. TO ASTM A351 Gr. CF8)	125	5	1	WDV-9	SEE PAGE 29/53 № 4216121
	PRESSURE REDUCING VALVE		16	13		CAST STEEL SCPH2 JIS G 5151 (EQUIV. TO ASTM A216 Gr. WCB)		STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	125	5	1	WDV-10	SEE REF. NO. 26 № 4216125
	RELIEF VALVE		16	[illegible]			STAINLESS STEEL SUS 420 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 420)		IN OUT 80×100	3×4	1	WDV-12	SEE REF. NO. 28 № 4216124
			10	7					IN OUT 65×80	2½×3	1	WDV-13	

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1640

(FIRE EXTINGUISHER)
FITTING LIST (4/6)

SYMBOL	NAME		SERVICE	PRESS. RATE	MAX. WORK. PRESS. (kgf/cm²)	WORK. TEMP. (°C)	MATERIAL OR PARTICULARS	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
150 D	50 LB	DRY CHEMICAL FIRE EXTINGUISHER	–	–	–	–	U.S.C.G. APPROVED TYPE SPARE : 50 PERCENT			3		SEE REF. NO. 15 S/# 4219311 SPARE : 2 SETS (REFILL)
10 D	10 LB						U.S.C.G. APPROVED TYPE SPARE : 100 PERCENT §95.05-20 (SAND → 10 LB DRY CHEMICAL FIRE EXTINGU. §95.50			39		SEE REF. NO. 15 S/# 4219311 SPARE : 39 SETS (REFILL)
5 D	5 LB									20		SEE REF. NO. 15 S/# 4219311 SPARE : 20 SETS (REFILL)
15 C	15 LB	CARBON DIOXIDE FIRE EXTINGUISHER								2		SEE REF. NO. 15 S/# 4219311 SPARE : 2 SETS (complete)
	FOAM APPLICATOR						U.S.C.G. APPROVED TYPE CAPACITY : 20 L (WITH SPARE) SOLAS '81 II-2.7			1		SEE REF. NO. 15 S/# 4219313

FITTING LIST (6/6)

SYMBOL	TYPE	SERVICE	PRESS. RATE (kgf/cm²)	MAX. WORK. PRESS. (kgf/cm²)	WORK. TEMP. (°C)	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
	GLOBE VALVE	CONTROL AIR	16	8.4 (119 psi)	30	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)	STAINLESS STEEL SUS304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)	15	1/2	2	CAV-900-1~2	SEE PAGE 32/33-2 S/# 4216113
	SCREW DOWN STOP CHECK GLOBE VALVE								15	1/2	1	CAV-901	SEE PAGE 32/33-3 S/# 4216113
	GLOBE VALVE		20						6	1/4	2	CAV-930	SEE REF. NO. 19 S/# 4216113 S/# 4216155
									6	1/4	1	CAV-931	
									6	1/4	1	CAV-932	
P	PRESSURE GAUGE		17			BOURDON TUBE: STAINLESS STEEL SUS316 JIS G4303 (EQUIV. TO ASTM A182 Gr. F316)	–	–	–	1/2" × 4"φ	1	CAV-940	S/# 4216134
S	SOLENOID TYPE THREE WAY VALVE		10			MAKER STD. [SEE REF NO. 23]			6	1/4	3	CAV-910~912	SEE REF NO. 23 S/# 4216133
	SELF-CONTAINED BREATHING APPARATUS WITH LIFE LINE	–	–	–	–	USCG APPROVED TYPE					2		OFE
	FULL-PROTECTIVE CLOTHING										4		

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FITTING LIST (3/6)

SYMBOL	NAME		SERVICE	PRESS. RATE	MAX. WORK. PRESS. (kgf/cm²)	WORK. TEMP. (°C)	MATERIAL OR PARTICULARS	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
	SINGLE WATER STRAINER		SEA WATER	10	3.5	38	MATERIAL BODY: CAST STEEL SC49 (EQUIV. TO ASTM A216 Gr.WCA) STRAINER: STEEL SS41 JIS G3101 (EQUIV. TO ASTM A36)	200	8	1	WDV-60	SEE REF NO 29 S/# 4216132
	ANCHOR WASHING PIECE			10	7		MATERIAL BODY: CARBON STEEL PIPE STPG38-E JIS G3454 (EQUIV. TO ASTM A53 Gr.A-E) ADJUSTABLE NOZZLE: COPPER PIPE C1220T JIS H 3300 (EQUIV. TO ASTM B88 Gr. C12200) SPEC.	25	1	6	WDV-61	SEE PAGE 42/53 S/# 4216128
FH #00	FIRE HYDRANT	HOSE LOCKER		–	–		CONTENTS: 1~65A FIRE HYDRANT VALVE (WDV-16) 1~2½"-15M (50') FIRE HOSE 1~NOM. 7/8" COMBINATION SOLID STREAM AND WATER SPRAY NOZZLE 1~HOSE SPANNER §95.10-10			23	WDV-50-1~23	LOCKER, RACK & BOX: SEE PAGE 23/53~27/53 S/# 4216126
		HOSE RACK								31	WDV-52-1~31	HOSE VALVE: SEE PAGE 3/53, 31/53 S/# 4216111
		HOSE BOX					CONTENTS: 1~65A FIRE HYDRANT VALVE (WDV-17 or 18) 1~65A (40A/40A) SIAMESE HOSE CONNECTION 1~1½"-23M (75') FIRE HOSE 1~NOM. 5/8" COMBINATION SOLID STREAM AND WATER SPRAY NOZZLE 1~HOSE SPANNER §95.10-10			6	WDV-51-1~6 (設-航(内)手配)	HOSE, NOZZLE, SIAMESE HOSE CONN. & SPANNER: SEE PAGE 34/53~38/53 S/# 4216115
	HOSE LOCKER FOR WASH DK.						1~1½"-15M (50') RUBBER COVERED HOSE WITH 40A COUPLING AND ADAPTER 65A/40A 1~½" JET NOZZLE MATERIAL OF LOCKER F.R.P. SPEC.			2	WDV-55	HOSE, NOZZLE & ADAPTER: S/# 4216115 HOSE LOCKER: SEE PAGE 43/53 S/# 4216119
	LOW-VELOCITY WATER SPRAY APPLICATOR						U.S.C.G. APPROVED TYPE §95.10-10(l) LENGTH : 4' SIZE : 1½" - 60° LOCATION : ENGINE RM. ONLY			17	WDV-56	SEE PAGE 39/53, 40/53 S/# 4216115
	INTERNATIONAL SHORE CONNECTION			16	10.5 (150 LB)		MATERIAL BODY: BC6 JIS H5111 (EQUIV. TO ASTM B62) U.S.C.G. §95.10-10(c)	65		1	WDV-57	SEE PAGE 41/53 S/# 4216115

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(FIREMAN'S OUTFITS)
FITTING LIST (5/6)

SYMBOL	NAME		SERVICE	PRESS. RATE	MAX. WORK. PRESS. (kgf/cm²)	WORK. TEMP. (°C)	MATERIAL OR PARTICULARS	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
F/O	FIREMAN'S OUTFITS	SELF CONTAINED BREATHING APPARATUS WITH LIFE LINE ATTACHED	–	–	–	–	U.S.C.G. APPROVED TYPE §96.35			2		SEE REF. NO. 16 S/# 4219313
		FLASH LIGHTS								2		SEE REF. NO. 16 S/# 4219312
		FLAME SAFETY LAMPS								2		S/# 4219315
		RIGID HELMENTS								2		S/# 4219312
		PROTECTIVE CLOTHINGS WITH BOOTS AND GLOVES								2		S/# 4219312
		FIRE AXES (HANDY TYPE)								2		S/# 4219316
	FIRE BUCKETS						MATERIAL : JIS G3101 SS41 (EQUIV. TO ASTM A36) SPEC.			2	WDV-58	S/# 4219317
	FIRE AXES						U.S.C.G APPROVED TYPE §95.60-5			8	WDV-59	S/# 4219316

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17/53

1641

FIRE HYDRANT STATION (1/2)

NOTE. 1) EACH FIRE HYDRANT STATION SHELL BE EQUIPPED WITH FIRE HOSE, CONBINED NOZZLE, WHICH ARE NORMALLY CONNECTED TO HYDRANT, SPANNER.

HYDRANT STATION No.	TYPE	LOCATION DK.	COMPARTMENT or PLACE	HOSE VALVE NOMI. SIZE	HOSE VALVE TYPE	HOSE VALVE LIST NO.	HOSE RACK, LOCKER or BOX TYPE	HOSE RACK, LOCKER or BOX LIST NO.	REMARK
FH-#1	L-4	06	EXPOSED NAV. BRI. DK. (S. SIDE)	65	ANGLE	WDV-16-1	LOCKER	WDV-50-1	
2	L-1	06	〃 (P. SIDE)			16-2		50-2	
3	B-2	05	SR. OFFICER'S DK. PASSAGE WAY		GLOBE	17-1	BOX	51-1	
4	B-4	04	PASSENGER DK. PASSAGE WAY			17-2		51-2	
5	L-4	03	EXPOSED BOAT DK. (S. SIDE)		ANGLE	16-3	LOCKER	50-3	
6	L-3	03	〃 (P. SIDE)			16-4		50-4	
7	B-4	02	CREW DK. PASSAGE WAY		GLOBE	17-3	BOX	51-3	
8	B-2	01	SALOON DK. PASSAGE WAY			17-4		51-4	
9	L-3	01	EXPOSED SALOON DK. (FWD.)		ANGLE	16-5	LOCKER	50-5	
10	B-4		UPP. DK. PASSAGE WAY IN ACCOM.		GLOBE	17-5	BOX	51-5	
11	R-1		BOATSN'S STORE			17-6	RACK	52-1	
12	B-1	2ND. DK.	SECOND DK. PASSAGE WAY IN ACCOM.			17-7	BOX	51-6	
13	R-1	NO.1 S.STR. LEVEL	FWD. MACHINERY SPACE △ BZ		ANGLE	18-1	RACK	52-2	
14		NO.2 S.STR. LEVEL	FWD. MACHINERY SPACE		GLOBE	17-8		52-3	
15	L-4	EXPOSED UPP. DK.	ACCOMMODATION AFT WALL (S)		ANGLE	16-6	LOCKER	50-6	
16	L-3		〃 (P)			16-7		50-7	
17	L-3		FR. 239 (S. SIDE)			16-8		50-8	
18	L-4		〃 (P. 〃)			16-9		50-9	
19	L-3		FR. 204 (S. 〃)			16-10		50-10	
20	L-4		〃 (P. 〃)			16-11		50-11	
21	L-3		FR. 168 (S. 〃)			16-12		50-12	
22	L-4		〃 (P. 〃)			16-13		50-13	
23	L-3		FR. 132 (S. 〃)			16-14		50-14	
24	L-4		〃 (P. 〃)			16-15		50-15	
25	L-4		FR. 105 (CENTER)			16-16		50-16	
26	L-1		FR. 85 (S. SIDE)			16-17		50-17	
27	L-2		〃 (P. 〃)			16-18		50-18	
28	L-1		FR. 43 (S. SIDE)			16-19		50-19	
29	L-2		〃 (P. 〃)			16-20		50-20	
30	L-1		FR. 8 (CENTER)			16-21		50-21	

M.8.82.000.OE.OP.1.PA.10158(T)A

DWG. NO. 4116101, 18/53

FIRE HYDRANT STATION (2/2)

NOTE. 1) EACH FIRE HYDRANT STATION SHELL BE EQUIPPED WITH FIRE HOSE, CONBINED NOZZLE, WHICH ARE NORMALLY CONNECTED TO HYDRANT, SPANNER.

HYDRANT STATION No.	TYPE	LOCATION DK.	COMPARTMENT or PLACE	HOSE VALVE NOMI. SIZE	HOSE VALVE TYPE	HOSE VALVE LIST NO.	HOSE RACK, LOCKER or BOX TYPE	HOSE RACK, LOCKER or BOX LIST NO.	REMARK
FH-#31	R-1	UNDER DK. PASSAGE WAY	FR. 267 (CENTER)	65	GLOBE	WDV-17-9	RACK	WDV-52-4	
32			FR. 228 (S. SIDE)			17-10		52-5	
33			〃 (P. 〃)			17-11		52-6	
34			FR. 171 (S. 〃)			17-12		52-7	
35			〃 (P. 〃)			17-13		52-8	
36			FR. 114 (S. 〃)			17-14		52-9	
37			〃 (P. 〃)			17-15		52-10	
38			FR. 33 (S. 〃)			17-16		52-11	
39			FR. 31 (P. 〃)			17-17		52-12	
40			STEER. GEAR RM.			17-18		52-13	
41	L-2	13.05M ON U.D.	ENGINE CASING TOP		ANGLE	16-22	LOCKER	50-22	
42	L-3	5.2M ON U.D.	EMERG. GEN. RM. TOP			16-23		50-23	
43	R-1	4.95M ON U.D.	ENGINE CASING 4.95M LEVEL ON UPP. DK.			18-2	RACK	52-14	WITH LOW-VELOCITY WATER SPRAY APPLICATOR (WDV-56)
44		UPP. DK.	ENGINE CASING ON UPP. DK. (S)			18-3		52-15	〃
45			〃 〃 (P)		GLOBE	18-4		52-16	〃
46		PARTIAL DK.	ENGINE RM. FWD. P. SIDE		GLOBE	17-19		52-17	〃
47			〃 〃 S. SIDE			17-20		52-18	〃
48			〃 AFT 〃			17-21		52-19	〃
49		2ND. DK.	ENGINE RM. FWD. S. SIDE		GLOBE	17-27		52-20	〃
50			〃 〃 P. SIDE		ANGLE	18-6		52-21	〃
51			〃 AFT. S. SIDE		GLOBE	17-22		52-22	〃
52			〃 MID. P. SIDE		ANGLE	18-7		52-23	〃
53			〃 AFT 〃			18-8		52-24	〃
54		3RD. DK.	ENGINE RM. FWD. CENTER		GLOBE	17-28		52-25	〃
55			〃 AFT P. SIDE			17-29		52-26	〃
56			〃 〃 S. SIDE		ANGLE	18-11		52-27	〃
57		ON FLOOR	ENGINE RM. FWD. CENTER		GLOBE	17-23		52-28	〃
58			〃 AFT S. SIDE			17-24		52-29	〃
59			〃 〃 P. SIDE			17-25		52-30	〃
60			SHAFT TUNNEL			17-26		52-31	

M.8.82.000.OE.OP.1.PA.10158(T)A

DWG. NO. 4116101, 19/53

FIRE EXTINGUISHER 1/3

LOCATION	EQUIPMENT / COMPARTMENT	DRY CHEMICAL 5D 5LB USCG TYPE AII	DRY CHEMICAL 10D 10LB USCG TYPE BII, CII	DRY CHEMICAL 150D 150LB USCG TYPE BV		CARBON DIOXIDE 15C 15LB USCG TYPE CII		FOAM APPLICATOR 20L (WITH SPARE)	REMARKS
NAV. BRI. DK.	WHEEL HOUSE	* 2							SOLAS II-2-6
	ELECT. RM.								
	BATT. RM.								
	ELECT. RM. (OUTSIDE)	1							OWNER'S REQUEST
	OTHERS								
SR. OFFR. DK.	RADIO RM.					1			USCG TITLE 46 §95.50
	CORRIDOR	1							〃
	COMPUTER RM.								
	OTHERS								
PASSENG. DK.	CORRIDOR	1							USCG TITLE 46 §95.50
	OTHERS								
BOAT DK.	CORRIDOR	1							USCG TITLE 46 §95.50
	OFFICER REC. RM.								
	OTHERS								
CREW DK.	CORRIDOR	1							USCG TITLE 46 §95.50
	OTHERS								
CARGO DK. PASSAGE	CARGO DK. PASSAGE	8							ABS'S REQ.

* EQUIVALENT TO CI TYPE

共 (7) 92010-2. A4. ト. ■. 80,000 52.9

三井造船株式会社　DWG. NO. 4116101, 20/53

FIRE EXTINGUISHER 2/3

LOCATION	EQUIPMENT / COMPARTMENT	DRY CHEMICAL 5D 5LB USCG TYPE AII	DRY CHEMICAL 10D 10LB USCG TYPE BII, CII	DRY CHEMICAL 150D 150LB USCG TYPE BV		CARBON DIOXIDE 15C 15LB USCG TYPE CII		FOAM APPLICATOR 20L (WITH SPARE)	REMARKS
SALOON DK.	CREW REC. RM.								
	CREW'S MESS RM.								
	CREW PANT. LKR.								
	GALLEY					1			USCG TITLE 46 §95.50
	OFFR'S PANT.								
	DUTY MESS RM.								
	HOSPITAL								
	OFFR. & PASS. DINING RM.								
	CORRIDOR	1							USCG TITLE 46 §95.50
	OTHERS								
UPP. DK. (FWD. PART)	BALLAST CONT. RM. & CARGO OFFICE								
	CORRIDOR	2							USCG TITLE 46 §95.50
	BOATSN'S STORE								
	OTHERS								
SECOND DK.	FWD. SWITCH RM.								
	FIRE CONT. STATION								
	PROV. REF. MACH. RM.								
	SHIP'S LAUND.								
	CO_2 BOTTLE RM.								
	CORRIDOR	1							USCG TITLE 46 §95.50
	FWD SWITCHBOARD RM. (OUTSIDE)	1							OWNER'S REQUEST
	OTHERS								
FWD. MACH. SPACE	FWD. MACH. SPACE		1						ABS'S REQ.

共 (7) 92010-2. A4. ト. ■. 80,000 52.9

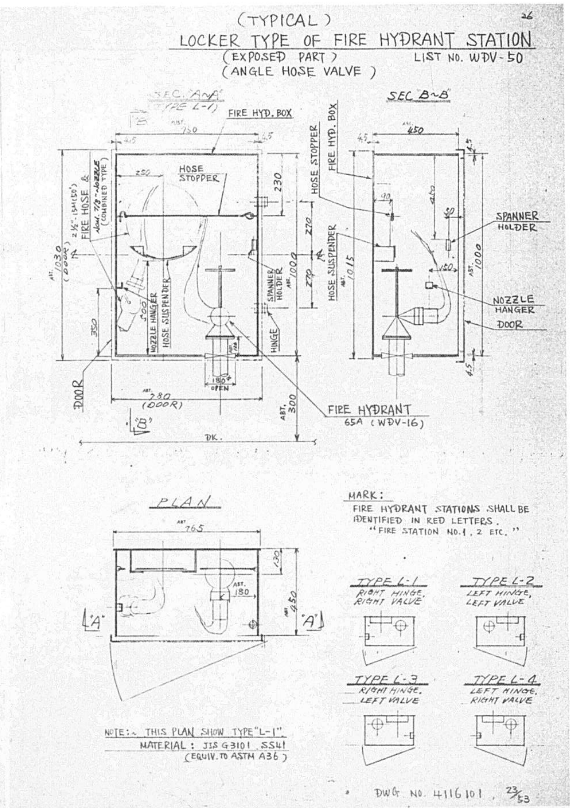
三井造船株式会社　DWG. NO. 4116101, 21/53

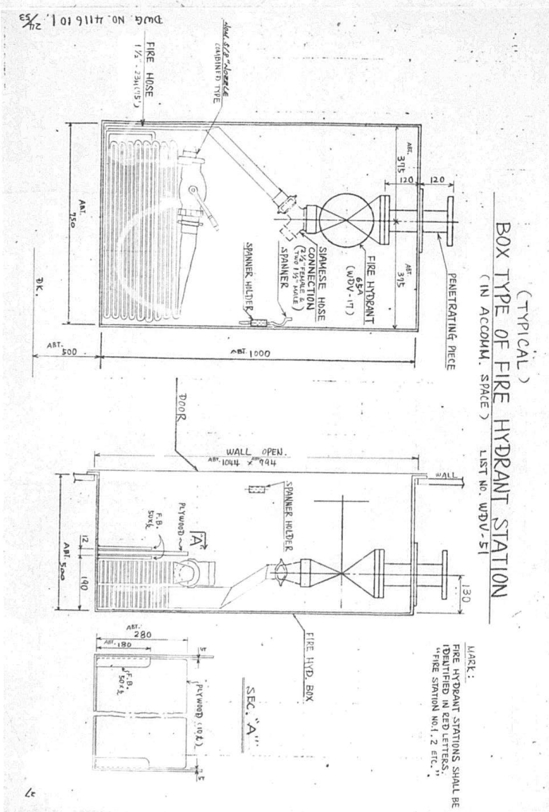
FIRE EXTINGUISHER 3/3

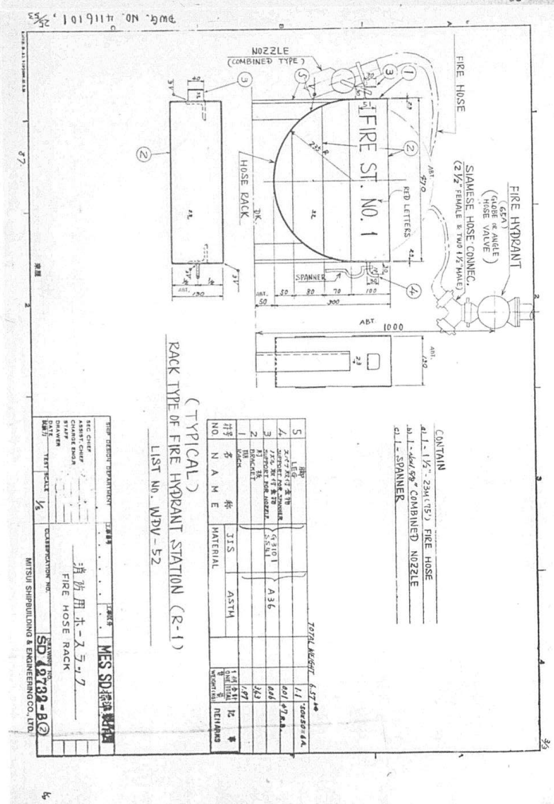
LOCATION	EQUIPMENT / COMPARTMENT	DRY CHEMICAL 5 D	DRY CHEMICAL 10 D	DRY CHEMICAL 150 D		CARBON DIOXIDE 15 C		FOAM APPLICATOR	REMARKS
		5 LB USCG TYPE A II	10 LB USCG TYPE B II, C II	150 LB USCG TYPE B V		15 LB USCG TYPE C II		20L (WITH SPARE)	
ENG. RM.	(a) INTERNAL COMB. MACHINERY SPACES		6						USCG TITLE 46 § 95.50 ABS 39.33
ENG. RM.	(b) SPACE CONTAINING OIL FIRED BOILERS OR THEIR FUEL OIL UNIT								
ENG. RM.	· BOILER		2	1					USCG TITLE 46 § 95.50
ENG. RM.	· PURIF. SPACE		2	1				1	SOLAS '74 II-2.7
ENG. RM.	· PUMP & HTRS. SP.		2	1					ABS 39.23
ENG. RM.	(c) GENERATORS OF SEMI. OPEN TYPE								
ENG. RM.	· DIESEL GEN.		6						USCG TITLE 46 § 95.50 ABS 39.33
ENG. RM.	· SHAFT. GEN.		1						USCG TITLE 46 § 95.50
ENG. RM.	(D) ENG. CONT. RM.								
ENG. RM.	(E) WORK SHOP								
ENG. RM.	(F) 2.6 M LEVEL (ENG. GEN. RM.)		1						USCG TITLE 46 § 95.50
ENG. RM.	(4) BURNER OF AUX. BOILER		1						ABS 39.23
ENG. RM.	(H) OTHERS		3						SOLAS '74 II-2.7
UPP. DK. (AFT. PART)	EXPOSED UPP. DK. (PAINT RM.)		(OUTSIDE) 1						USCG TITLE 46 § 95.50
UPP. DK. (AFT. PART)	OUTSIDE ENGINE RM. (NEAR EXIT OF ENG. RM.)		3						ABS 41.79.5

共 (7) 92010-2. A4. ト. ■. 80,000 52.9

三井造船株式会社 DWG. NO. 4116101, 22/53



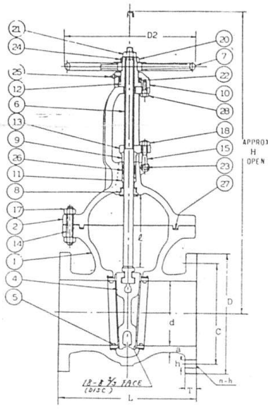




1643

29

Fig. ____________



NO.	PARTS	MATERIAL	JIS	ASTM
28	BOLT	STEEL	S35C	A105
27	GASKET	ASBESTOS FREE		
26	PACKING	ASBESTOS FREE		
25	GREASE NIPPLE	STEEL	COMMERCIAL (Cr. PLT.)	
24	SET SCREW	STEEL	COMMERCIAL	
23	HINGE PIN	STEEL	S35C	A105
22	BALL BEARING	STEEL	COMMERCIAL	
21	STOPPER	STEEL	SS41	A307 Gr.B
20	WHEEL NUT	STEEL	SS41	A307 Gr.B
19				
18	NUT	STEEL	SS41	A307 Gr.B
17	NUT	STEEL	SS41	A307 Gr.B
16				
15	EYE BOLT	STEEL	S35C	A105
14	BOLT	STEEL	S35C	A105
13	GLAND FLANGE	STEEL	S35C	A105
12	YOKE SLEEVE	HIGH BRASS	HBsC2	B584 No. 864
11	BONNET BUSH	Al. BRONZE	AlBC2	B148 No. 954
10	YOKE CAP	STEEL	S35C	A105
9	GLAND	BRONZE	BC6	B62
8	NECK BUSH	STAINLESS STEEL	SUS 420	A276 420
7	HANDWHEEL	CAST IRON	FC 20	A126 Gr.A
6	STEM	STAINLESS STEEL	SUS 304	A276 304
5	SEAT RING	STAINLESS STEEL	SUS 304	A276 304
4	DISC	CAST STEEL	~~SC49~~	A216 WCB
3				
2	BONNET	CAST STEEL	~~SC49~~	A216 WCB
1	BODY	CAST STEEL	~~SC49~~	A216 WCB

VALVE LIST NO. WDV-4

HYDRO. TEST PRESSURE SHELL	HYDRO. TEST PRESSURE SEAT	WORKING PRESS.	WORKING TEMP.
58 kg/cm²	40 kg/cm²		
824 psi	568 psi		

CONFORM TO
JIS B 2083

BOLT HOLES OF END FLANGES STRADDLE CENTER LINE

SIZE	d	L		FLANGE (20 kg/cm²) D	C	n	h	T	g	f	H	ℓ	D2	a		WT. (kg)	Q'TY
200	200	419		350	305	12	25	30	/	/	1105	220	400	18		246	

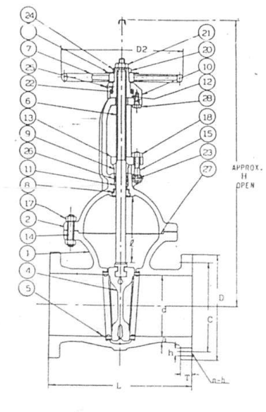
CAST STEEL 16 kg/cm²
BB. OS & Y GATE VALVE

DRAWN	[signature]	DATE	Feb. 19. 85
CHK'D	[signature]	DATE	Feb. 19. 85
SHEET NO		DRAWING NO	

DWG. NO. 4116101, 26/53

30

Fig. ____________



NO.	PARTS	MATERIAL	JIS	ASTM
28	BOLT	STEEL	S35C	A105
27	GASKET	ASBESTOS FREE		
26	PACKING	ASBESTOS FREE		
25	GREASE NIPPLE	STEEL	COMMERCIAL (Cr. PLT.)	
24	SET SCREW	STEEL	COMMERCIAL	
23	HINGE PIN	STEEL	S35C	A105
22	BALL BEARING	STEEL	COMMERCIAL	
21	STOPPER	STEEL	SS41	A307 Gr.B
20	WHEEL NUT	STEEL	SS41	A307 Gr.B
19				
18	NUT	STEEL	SS41	A307 Gr.B
17	NUT	STEEL	SS41	A307 Gr.B
16				
15	EYE BOLT	STEEL	S35C	A105
14	BOLT	STEEL	S35C	A105
13	GLAND FLANGE	STEEL	S35C	A105
12	YOKE SLEEVE	HIGH BRASS	HBsC2	B584 No. 864
11	BONNET BUSH	Al. BRONZE	AlBC2	B148 No. 934
10	YOKE CAP	STEEL	S35C	A105
9	GLAND	BRONZE	BC6	B62
8	NECK BUSH	STAINLESS STEEL	SUS 420	A276 420
7	HANDWHEEL	CAST IRON	FC 20	A126 Gr.A
6	STEM	STAINLESS STEEL	~~SUS 304~~	A276 304
5	SEAT RING	STAINLESS STEEL	SUS 304	A276 304
4	DISC	STAINLESS STEEL	~~SCS13A~~	A351 CF8
3				
2	BONNET	CAST STEEL	~~SC49~~	A216 WCB
1	BODY	CAST STEEL	~~SC49~~	A216 WCB

VALVE LIST NO. WDV-5

HYDRO. TEST PRESSURE SHELL	HYDRO. TEST PRESSURE SEAT	WORKING PRESS.	WORKING TEMP.
58 kg/cm²	40 kg/cm²		
824 psi	568 psi		

CONFORM TO
JIS B 2083

BOLT HOLES OF END FLANGES STRADDLE CENTER LINE

SIZE	d	L		FLANGE (20 kg/cm²) D	C	n	h	T	g	f	H	ℓ	D2	a		WT. (kg)	Q'TY
150	150	403		305	260	12	25	28	/	/	900	171	355	16		160	

CAST STEEL 16 kg/cm²
BB. OS & Y GATE VALVE

DRAWN	[signature]	DATE	Feb. 19. 85
CHK'D	[signature]	DATE	Feb. 19. 85
SHEET NO		DRAWING NO	

DWG. NO. 4116101, 27/53

31

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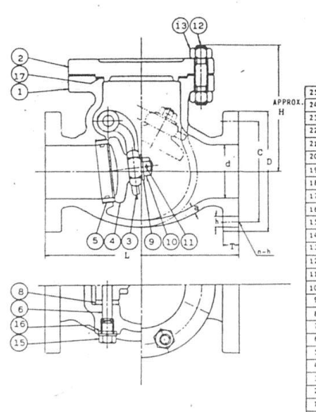


NO.	PARTS	MATERIAL	JIS	ASTM
25				
24				
23				
22				
21				
20				
19				
18				
17	GASKET	ASBESTOS FREE		
16	GASKET	ASBESTOS FREE		
15	PLUG	STAINLESS STEEL	SUS 304	A276 304
14				
13	NUT	STEEL	S25C	A307 Gr.B
12	BOLT	STEEL	S35C	A105
11	COTTER PIN	STAINLESS STEEL	COMMERCIAL	
10	NUT	STAINLESS STEEL	SUS 304	A276 304
9	WASHER	STAINLESS STEEL	SUS 304	A276 304
8	COLLAR	STAINLESS STEEL	SUS 304	A276 304
7				
6	PIN	STAINLESS STEEL	SUS 304	A276 304
5	SEAT RING	STAINLESS STEEL	SUS 304	A276 304
4	DISC	STAINLESS STEEL	~~SCS 13 A~~	A351 CF8
3	HINGE	STAINLESS STEEL	SCS 13 A	A351 CF8
2	CAP	CAST STEEL	~~SC49~~	A216 WCB
1	BODY	CAST STEEL	~~SC49~~	A216 WCB

SPECIFIDE PRESS. & TEMP.

FLUID
HYDRAULIC TEST PRESSURE
SHELL 58 kg/cm² | 824 psi
SEAT 40 kg/cm² | 568 psi

VALVE LIST NO. WDV-8

CONFORM TO
JIS B 2084

BOLT HOLES OF END FLANGES STRADDLE CENTER LINE

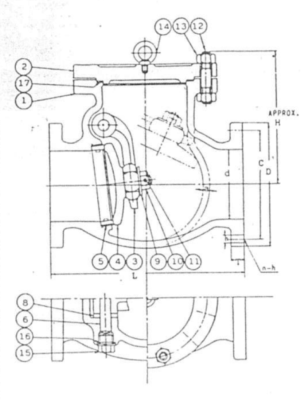
SIZE	d	L	L1	FLANGE (20 kg/cm²) D	C	n		h	T	g	f	H	ℓ	D2	a		WT. (kg)	P'cs.
40	40	241	/	140	105	4	/	19	18	/	/	157	/	/	9		20	
50	50	267	/	155	120	8	/	19	18	/	/	168	/	/	10		25	
→ 65	65	292	/	175	140	8	/	19	20	/	/	198	/	/	11		40	
80	80	318	/	200	160	8	/	23	22	/	/	212	/	/	12		50	
100	100	356	/	225	185	8	/	23	24	/	/	234	/	/	13		62	

CAST STEEL 16 kg/cm²
SWING CHECK VALVE

DRAWN	[signature]	DATE	Feb. 19. 85
CHK'D	[signature]	DATE	Feb. 19. 85
SHEET NO		DRAWING NO	

DWG. NO. 4116101, 28/53

32



NO.	PARTS	MATERIAL	JIS	ASTM
25				
24				
23				
22				
21				
20				
19				
18				
17	GASKET	ASBESTOS FREE		
16	GASKET	ASBESTOS FREE		
15	PLUG	STAINLESS STEEL	SUS 304	A276 304
14	EYE BOLT	STEEL	S25C	A307 Gr.B
13	NUT	STEEL	S25C	A307 Gr.B
12	BOLT	STEEL	S35C	A105
11	COTTER PIN	STAINLESS STEEL	COMMERCIAL	
10	NUT	STAINLESS STEEL	SUS 304	A276 304
9	WASHER	STAINLESS STEEL	SUS 304	A276 304
8	COLLAR	STAINLESS STEEL	SUS 304	A276 304
7				
6	PIN	STAINLESS STEEL	SUS 304	A276 304
5	SEAT RING	STAINLESS STEEL	SUS 304	A276 304
4	DISC	STAINLESS STEEL	~~SCS 13A~~	A351 CF8
3	HINGE	STAINLESS STEEL	SCS 13 A	A351 CF8
2	CAP	CAST STEEL	~~SC49~~	A216 WCB
1	BODY	CAST STEEL	~~SC49~~	A216 WCB

SPECIFIDE PRESS. & TEMP.

FLUID
HYDRAULIC TEST PRESSURE
SHELL 58 kg/cm² 824 psi
SEAT 40 kg/cm² 568 psi

VALVE LIST NO. WDV-7

BOLT HOLES OF END FLANGES STRADDLE CENTER LINE

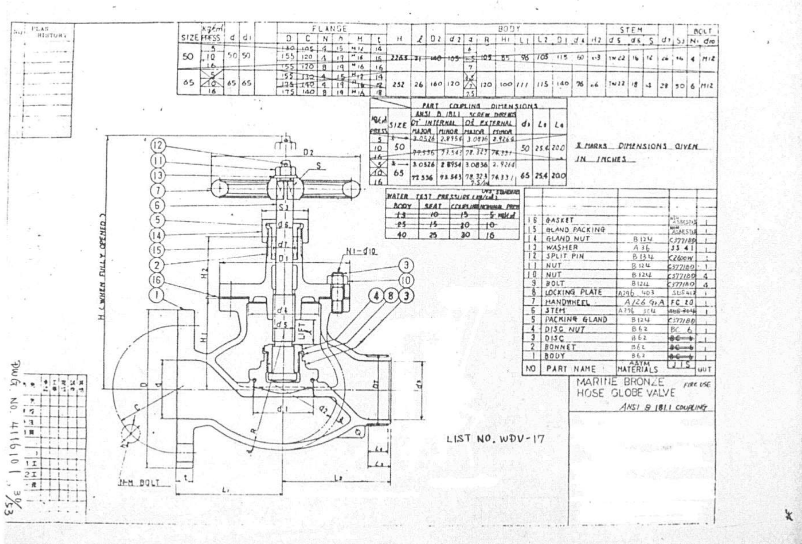
SIZE	d	L	L1	FLANGE (20 kg/cm²) D	C	n		h	T	g	f	H	ℓ	D2	a		WT. (kg)	P'cs.
125	125	400	/	270	225	8	/	25	26	/	/	270	/	/	14		89	
150	150	445	/	305	260	12	/	25	28	/	/	307	/	/	16		134	
→ 200	200	533	/	350	305	12	/	25	30	/	/	370	/	/	18		210	

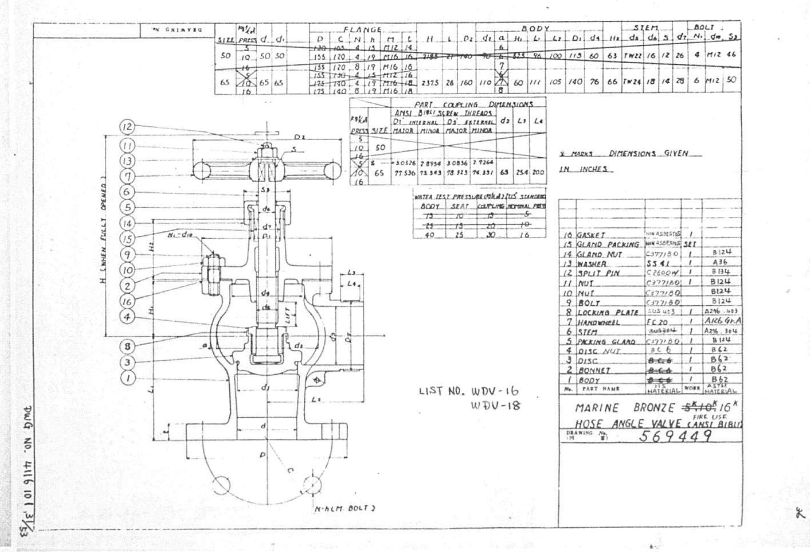
CAST STEEL 16 kg/cm²
SWING CHECK VALVE

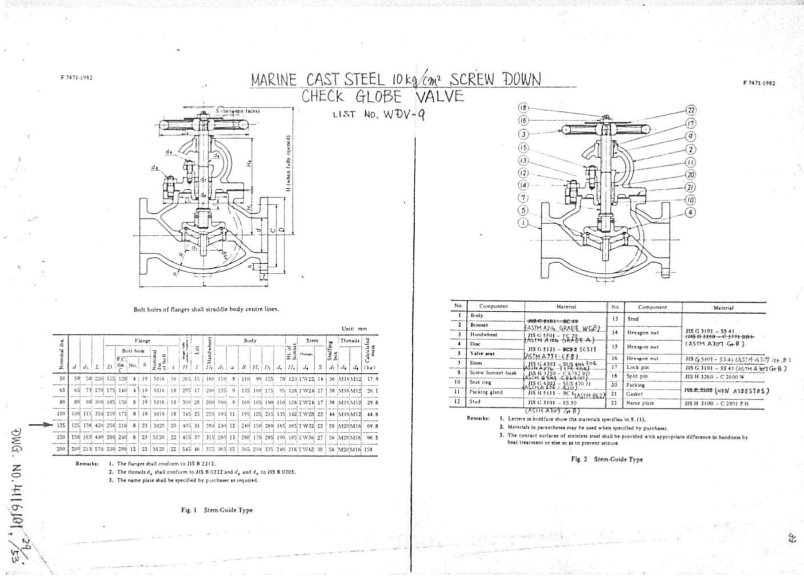
DRAWN:		DATE:	
CHK'D:		DATE:	
SHEET NO		DRAWING NO	

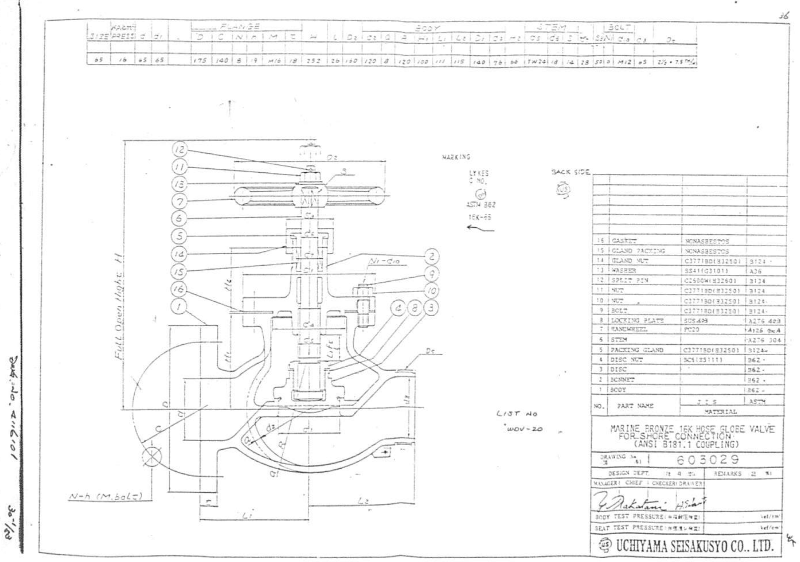
MITSUMOTO VALVE MFG. CO.
OSAKA JAPAN

DWG. NO. 4116101, 28-1/53

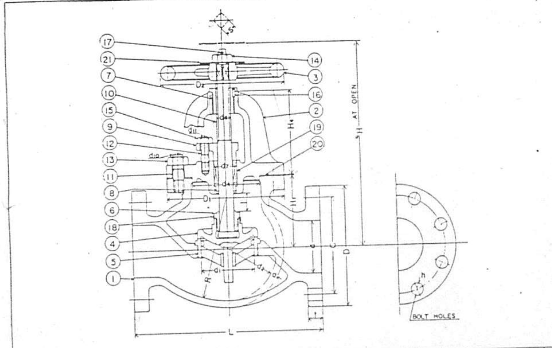

MARINE BRONZE
HOSE GLOBE VALVE
ANSI B 1811 COUPLING
LIST NO. WDV-17
X MARKS DIMENSIONS GIVEN IN INCHES
DWG NO. 411610I


MARINE BRONZE 16K
HOSE ANGLE VALVE (ANSI B1811)
569449
LIST NO. WDV-16
WDV-18
X MARKS DIMENSIONS GIVEN IN INCHES


MARINE CAST STEEL 10kg/cm² SCREW DOWN CHECK GLOBE VALVE
LIST No. WDV-9
Bolt holes of flanges shall straddle body centre lines.
Fig. 1 Stem-Guide Type
Fig. 2 Stem-Guide Type


MARINE BRONZE 16K HOSE GLOBE VALVE FOR SHORE CONNECTION (ANSI B181.1 COUPLING)
603029
LIST NO WDV-20
UCHIYAMA SEISAKUSYO CO., LTD.

1645



SIZE	d	d1	L	D	C	NO.	h	BOLT SIZE	t	H	l	D2	d2	a	R	H1	D1	d4	H4	d6	S	d7	d10	d11	MASS (kg)	Q'TY
				FLANGES	BOLT HOLES						LIFT		BODY							STEM			STUD BOLT			
50	50	58	220	155	120	4	19	M16	20	285	17	160	110	10	110	95	155	78	130	TW22	14	36	M16	M12	19.9	
65	65	73	270	175	140	4	19	M16	22	310	22	200	135	11	135	105	175	95	135	TW24	17	38	M16	M12	28.7	
80	80	88	300	185	150	8	19	M16	22	320	27	200	160	11	160	110	190	110	135	TW24	17	38	M16	M12	32.4	
																									48.7	
100	100	111	350	210	175	8	19	M16	24	370	33	250	195	12	195	130	215	135	150	TW28	22	44	M16	M12	73.1	
125	125	138	420	250	210	8	23	M20	24	420	42	280	240	13	240	150	260	165	170	TW32	22	50	M20	M16	104	
150	150	163	490	280	240	8	23	M20	26	470	50	315	280	14	280	170	285	190	182	TW36	27	56	M20	M16		
																			205	TW42	30	66	M20	M16	182	
200	200	213	570	330	290	12	23	M20	26	555	67	355	365	17	365	210	335	240								

DWG. NO. 4116101, 32/53

VALVE LIST NO. WDV-27

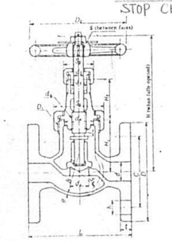
NO.	NAME OF PARTS	MATERIALS		Q'TY	REMARKS
21	NAME PLATE	C 2801 P	C 28000		
20	GASKET	NON ASBESTOS		1	
19	PACKING	NON ASBESTOS		1.5	
18	LOCK WASHER	C 2600 P	C 26000	1	
17	SPLIT PIN	C 2600 W	C 26000	1	
16	SET PIN	SS 41	A 36	1	
15	HEX. NUT	C 3771 BD	C 37700	2	
14	HEX. NUT	C 3771 BD	C 37700	1	
13	HEX. NUT	SS 41	A 563	–	
12	STUD BOLT	C 3771 BD	C 37700	2	
11	STUD BOLT	SS 41	A 307	–	
10	STEM	SUS 304	A276-304	1	
9	GLAND	BC 6	B 62	1	
8	BONNET BUSHING	BC 6	B 62	1	
7	SCREW BUSHING	BC 6	B 62	1	
6	DISC NUT	BC 6	B 62	1	
5	SEAT RING	BC 6	B 62	1	
4	DISC	BC 6	B 62	1	
3	HANDWHEEL	FC 20	A 48	1	
2	BONNET	FCD 45	A 395	1	
1	BODY	FCD 45	A 395	1	

TITLE REF. JIS F 7307
MARINE DUCTILE IRON 10 kgf/cm²
GLOBE VALVES (50–200)

SCALE: Free | TEST PRESSURE | SHELL 24 kgf/cm² | SEAT 15 kgf/cm²
DATE '82-09-11

MARINE BRONZE 16 kg/cm² SCREW DOWN STOP CHECK GLOBE VALVE

(VALVE LIST NO. CAV-401)



Bolt holes of flanges shall straddle body center lines.

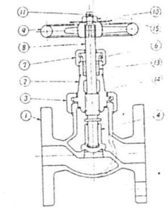
CAV-401

Unit: mm

[illegible]

Remarks: 1. The flanges shall conform to JIS B 2240.
2. The threads d_4 shall conform to JIS B 0222, and D_1 to JIS B 0207.
3. The name plate shall be specified by purchaser as required.

Fig. 1



No.	Component	Material
1	Body	JIS H 5111 – BC 6 (ASTM-B62)
2	Bonnet	JIS H 5111 – BC 6 or JIS H 3250 – C 3771 BD or C 3771 BE (ASTM-B62)
3	Bonnet nut	
4	Disc	
6	Packing gland	JIS H 5111 – BC 6 or JIS H 3250 – C 3771 BD (ASTM-B62)
7	Gland nut	
8	Stem	JIS H 3250 – C 3771 BD or C 3771 BE JIS G 4303 SUS304 (ASTM A276 TYPE 304)
9	Handwheel	JIS G 5501 – FC 20 (ASTM-A126 GRADE A)
10	Hexagon nut	JIS H 3250 – C 3771 BD (ASTM B124 C37700)
11	Split pin	JIS H 3260 – C 2600 W
13	Packing	JIS F 7102 NON ASBESTOS
14	Gasket	
15	Name plate	JIS H 3100 – C 2801 P

Remark: Letters in boldface show the materials specified in 4. (1).

Fig. 2

DWG. NO. 4116101, 32/53

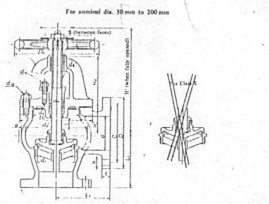
JS 1323/4/5

DUCTILE CAST IRON 10 kgf/cm² ANGLE VALVES

LIST NO. WDV-21

F 7308-1976

For nominal dia. 50 mm to 200 mm



Bolt holes of flanges shall straddle body center lines.

Unit: mm

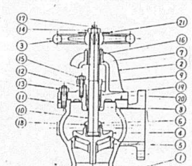
[illegible]

Remarks: 1. The flanges shall conform to JIS B 2212.
2. The threads d_4 shall conform to JIS B 0222, and d_{10} and d_{11} to JIS B 0205.
3. The name plate shall be specified by purchaser as required.
4. The calculated mass of valves in Class B

Fig. 1

F 7308-1976

For nominal dia. 50 mm to 200 mm



No.	Component	Material Class B	Class S	No.	Component	Material Class B	Class S
1	Body	JIS G 5502 – FCD45 (ASTM A 395)		12	Stud	JIS H 3250-C3771BD (ASTM C37700)	
2	Bonnet			13	Hexagon nut	JIS G 3101 – SS 41 (ASTM A 563)	
3	Handwheel	JIS G 5501 – FC 20 (ASTM A48)		14	Hexagon nut	JIS H 3250-C3771BD (ASTM C37700)	
4	Disc	JIS H 5111 – BC 6 (ASTM B62)	JIS G 5121 – SCS 2	15	Hexagon nut		
5	Valve seat			16	Lock pin	JIS G 3101 – SS 41 (ASTM A 36)	
6	Disc nut	JIS H 5111 – BC 6 (ASTM B62)	JIS G 4303 – SUS 420 J 1	17	Split pin	JIS H3260-C2600W (ASTM C26000)	
7	Screwed bonnet bush	JIS H 5111 – BC 6 (ASTM B62)		18	Disc lock washer	JIS G 3260-C2600P (ASTM C26000)	JIS G 4303 – SUS 304
8	Seat ring	JIS H 5111 – BC 6 (ASTM B62)	JIS G 4303 – SUS 420 J 1	19	Packing	JIS F 7102 (NON ASBESTOS)	
9	Packing gland	JIS H 5111 – BC 6 (ASTM B62)		20	Gasket		
10	Stem	JIS G 4303 SUS 304 (ASTM A276 TYPE 304)	JIS G 4303 – SUS 403	21	Name plate	JIS H3100 – C2801P (ASTM C28000)	
11	Stud	JIS G 3101 – SS 41 (ASTM A307)					

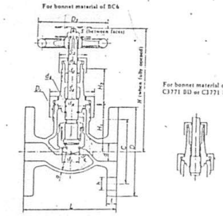
Remarks: 1. Letters in boldface show the materials specified in 4. (1).
2. The contact surfaces of stainless steel shall be provided with appropriate difference in hardness by heat treatment or else so as to prevent seizure.

Fig. 2

DWG. NO. 4116101, 33/53

MARINE BRONZE 16 kg/cm² GLOBE VALVE

For bonnet material of BC6



For bonnet material of C3771 BD or C3771 BE

Bolt holes of flanges shall straddle body center lines.

Unit: mm

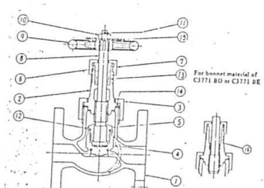
CAV-400

WDV-26

[illegible]

Remarks: 1. The flanges shall conform to nominal pressure 16 kgf/cm² of JIS B 2240.
2. The threads d_4 shall conform to JIS B 0222, and D_1 to JIS B 0207.
3. The name plate shall be specified by purchaser as required.

Fig. 1



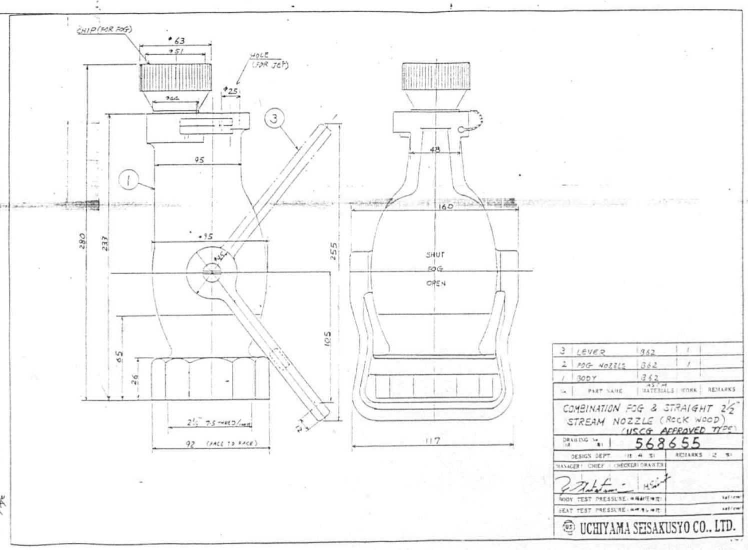
For bonnet material of C3771 BD or C3771 BE

No.	Component	Material
1	Body	JIS H 5111 – BC 6 (ASTM-B62)
2	Bonnet	JIS H 3250 – C 3771 BD or C 3771 BE or JIS H 5111 – BC 6 (ASTM-B62)
3	Bonnet nut	
4	Disc	
5	Disc nut	
6	Packing gland	JIS H 3250 – C 3771 BD or JIS H 5111 – BC 6 (ASTM-B62). JIS G 4303
7	Gland nut	
8	Stem	JIS H 3250 – C 3771 BD or JIS H 5111 – BC 6 (ASTM A276 TYPE 304)
9	Handwheel	JIS G 5501 – FC 20 (ASTM A126 GRDE A)
10	Hexagon nut	JIS H 3250 – C 3771 BD (ASTM B124 C37700)
11	Split pin	JIS H 3260 – C 2600 W
12	Disc lock washer	JIS H 3100 – C 2600 P JIS G 4303 SUS 303P (ASTM A240 TYPE 304)
13	Packing	JIS F 7102 NON ASBESTOS
14	Gasket	
15	Name plate	JIS H 3100 – C 2801 P
16	Seat ring	JIS H 3250 – C 3771 BD or C 3771 BE

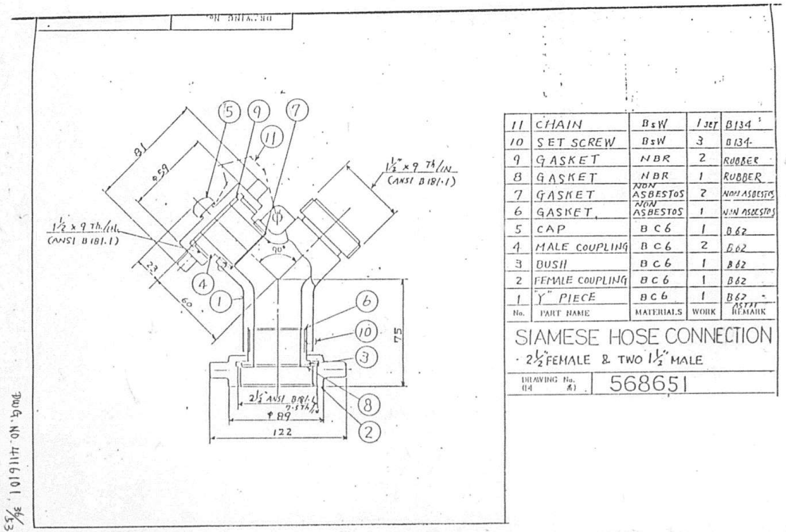
Remarks: Letters in boldface show the materials specified in 4. (1).

Fig. 2

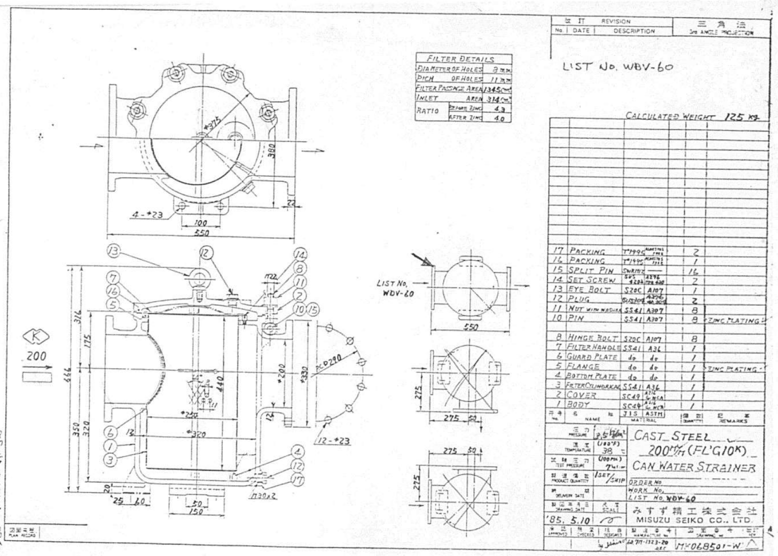
1646



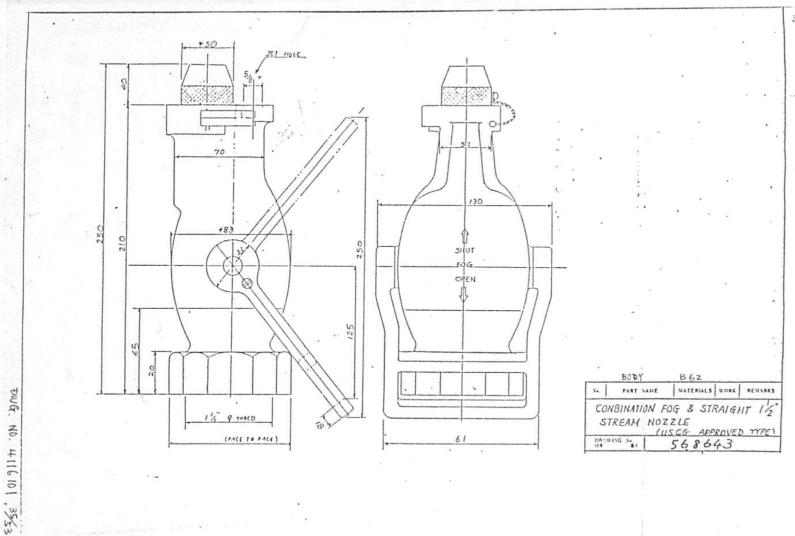
3 LEVER
2 FOG NOZZLE BC6
1 BODY BC6
COMBINATION FOG & STRAIGHT 2½" STREAM NOZZLE (ROCK WOOD) (USCG APPROVED TYPE)
568655
SHUT
FOG
OPEN
UCHIYAMA SEISAKUSYO CO., LTD.



11 CHAIN BsW 1 SET B134
10 SET SCREW BsW 3 B134
9 GASKET NBR 2 RUBBER
8 GASKET NBR 1 RUBBER
7 GASKET NON ASBESTOS 2 NON ASBESTOS
6 GASKET NON ASBESTOS 1 NON ASBESTOS
5 CAP BC6 1 B62
4 MALE COUPLING BC6 2 B62
3 BUSH BC6 1 B62
2 FEMALE COUPLING BC6 1 B62
1 "Y" PIECE BC6 1 B62
No. PART NAME MATERIALS WORK REMARK
SIAMESE HOSE CONNECTION
2½" FEMALE & TWO 1½" MALE
DRAWING No. 568651
1½" x 9 TH/IN (ANSI B1B1.1)

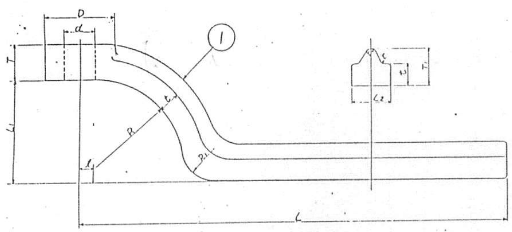


LIST NO. WBV-60
FILTER DETAILS
CALCULATED WEIGHT 125 kg
17 PACKING
16 PACKING
15 SPLIT PIN
14 SET SCREW
13 EYE BOLT
12 PLUG
11 NUT
10 PIN
9 HINGE BOLT
8 FILTER HANDLE
7 GUARD PLATE
6 FLANGE
5 BOTTOM PLATE
4 FILTER CYLINDER
3 COVER
2 BODY
CAST STEEL
200mm (FL'G 10K)
CAN WATER STRAINER
LIST NO. WBV-60
'85. 5.10
MISUZU SEIKO CO., LTD.



SHUT
FOG
OPEN
BODY BC6
COMBINATION FOG & STRAIGHT 1½" STREAM NOZZLE (USCG APPROVED TYPE)
568643

1647

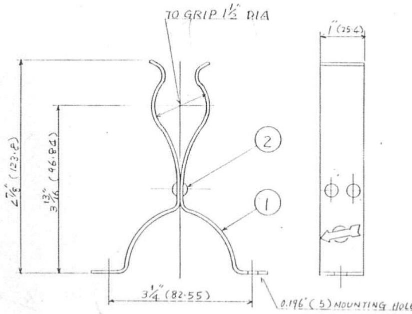


1	SPANNER	BC6	1	B62
No.	PART NAME	JIS MATERIALS	WORK	ASTM REMARK

HOSE SPANNER
(FOR ANSI TYPE COUPLING)

DRAWING No. 568562

SIZE	L	L1	L2	R	R1	T	T1	t	d	D	ℓ	r
40	156	38	14	33	12	13	13.5	8	12	26	5	2
65	190	43	16	40	13	14	15	8.5	17	27	6	3



No.	PART NAME	MATERIALS		REMARK
2	RIVET	STAINLESS ST.		
1	UTILITY CLIP	STAINLESS ST.		

UTILITY CLIP
FOR 1½" APPLICATOR

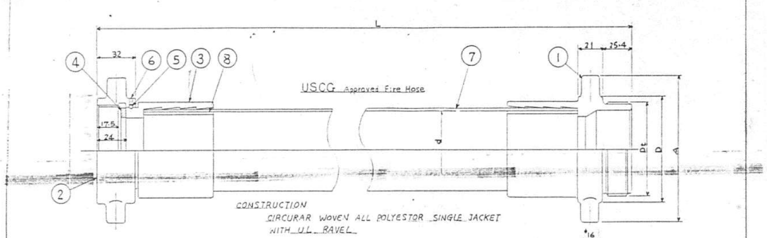
DRAWING No. 568664

ENGINEER OFFICE — MANAG.: Y. Nakatani; CHIEF.; CHECKED; DRAWER

REMARK: USCG APPROVED TYPE

DATE:

UCHIYAMA SEISAKUSHO CO., LTD.



SIZE	d	Dt	L	D	A	REMARKS
40	40	1½ × 9TH/IN	75 FEET	58	86	
65	65	2½ × 7.5TH/IN	50 FEET	88	122	

No.	PART NAME	MATERIALS	WORK	ASTM REMARKS
8	FASTENER	BC6	1	B62
7	HOSE	ALL POLYESTER SINGLE JACKET	1	
6	SET SCREW	BSW	1	B134
5	BALL	BS BFD2	1 SET	B124
4	PACKING	RUBBER	1	
3	HOSE CONNECTION	BC6	1	B62
2	FEMALE CONNECTION	BC6	1	B62
1	MALE CONNECTION	BC6	1	B62

FIRE HOSE
WITH ANSI B181.5 HOSE COUPLING

DRAWING No. 568595

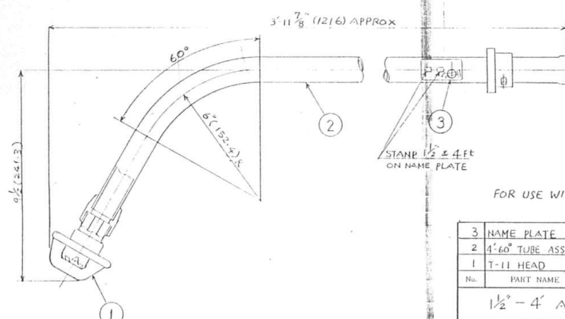
DESIGN DEPT. — MANAGER: Y. Nakatani; CHIEF; CHECKER; DRAWER

REMARKS: USCG Approved Type

BODY TEST PRESSURE

SEAT TEST PRESSURE

UCHIYAMA SEISAKUSYO CO., LTD.



FOR USE WITH 1½ SG 70 NOZZLE S-678

No.	PART NAME	MATERIALS		REMARK
3	NAME PLATE	ALUM.		
2	4'-60° TUBE ASSY	STEEL		
1	T-11 HEAD	BRONZE		

1½" - 4' APPLICATOR
TYPE CGG

DRAWING No. 568663

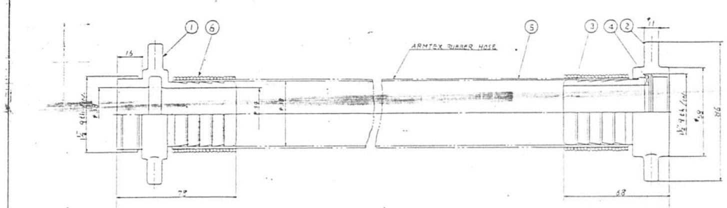
ENGINEER OFFICE — MANAG.: Y. Nakatani; CHIEF.; CHECKED; DRAWER

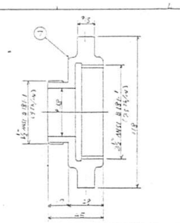
REMARK: USCG APPROVED TYPE

DATE:

UCHIYAMA SEISAKUSHO CO., LTD.

1648





FOR WASH DECK

MARK	USE	QUANTITY
FM 51M	FIRE HOSE	16

BURST PRESS	45 kg/cm²
TEMP	MAX 80°C
FLUID	SEA WATER
W.P.	MAX 10 kg/cm²
T.P.	18 kg/cm²

No.	PART NAME	MATERIALS	WORK	REMARK
7	ADAPTOR	BRONZE	1	B62
6	FASTEN UP	COPPER WIRE	1	C1220W
5	HOSE	SYNTHETIC COTTON	1	COATED WITH LATEX
4	PACKING	RUBBER	1	
3	HOSE CONNECTION	BRONZE	1	B62
2	FEMALE COUPLING	BRONZE	1	B62
1	MALE COUPLING	BRONZE	1	B62

40φ WASH DECK
HOSE WITH COUPLING

DRAWING No. 568574-WA

ENGINEER OFFICE | REMARK

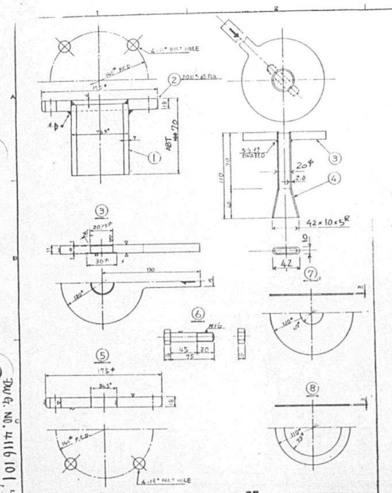
PART | HEAD | CHECK | DRAWING

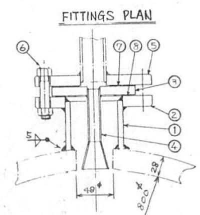
BODY TEST PRESSURE kg/cm²

SEAT TEST PRESSURE kg/cm²

UCHIYAMA SEISAKUSYO CO., LTD.

DWG. NO. 411610 1





符号 NO.	名称 NAME	MATERIAL JIS	MATERIAL ASTM	QUANTITY	重量 WEIGHT(KG) 1個 ONE	重量 WEIGHT(KG) 合計 TOTAL	記事 REMARKS
8	ガスケット GASKET	NON ASBESTOS	-	1			
7	ガスケット GASKET	NON ASBESTOS	-	1			
6	ボルトおよびナット BOLT & NUT	G3101 SS41B	A307 Gr.B	4 SETS			
5	胃付フランジ FLANGE	G3101 SS41P	A36	1			
4	調整ノズル ADJUSTABLE NOZZLE	H3300 C1220T	BB8.C12200	1			
3	フランジ FLANGE	H5111 BC7	B61	1			
2	フランジ FLANGE	G3101 SS41P	A36	1			JIS 5K 45 FLG.
1	パイプ PIPE	G3454 STPG38-E	A53 Gr.A-E	1			φ34 SCH.80

LIST NO. WDV-61

ISOねじ

M.S.標準製作図

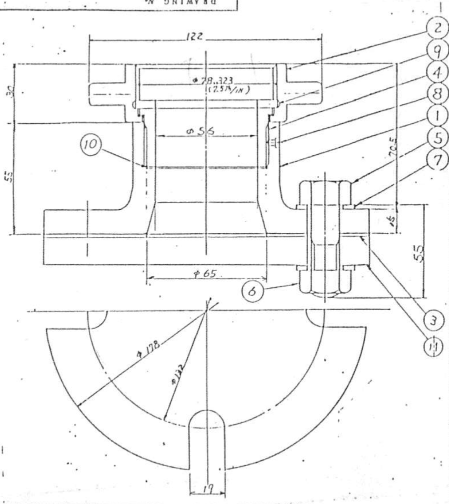
錨鎖洗浄管ピース
ANCHOR WASHING PIECE

SHIP DESIGN DEPARTMENT
SEC CHIEF
ASSIST. CHIEF
CHARGE ENG.R
STAFF
DRAWER
DATE

試験圧力 TEST | SCALE 1/25 | CLASSIFICATION NO. | DRAWING NO. ~~MS-12750~~

MITSUI SHIPBUILDING & ENGINEERING CO., LTD.

DWG. NO. 411610 1

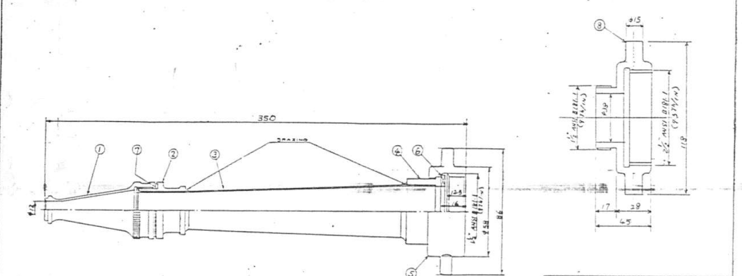


No.	PART NAME	MATERIALS	ASTM
11	Blank Flange	MILD STEEL	A36
10	Gasket	ASBESTOS	NON ASBESTOS
9	Gasket	RUBBER	NBR
8	Set Screw	BRASS WIRE	B134 No.260
7	Washer	BRASS PLATE	B36 C26800
6	Nut	BRASS BAR	B124 C37700
5	Bolt	BRASS BAR	B124 C37700
4	Bush	CAST BRONZE	B62 CA826
3	Gasket	ASBESTOS	NON ASBESTOS
2	Cross Ring	CAST BRONZE	B62 CA826
1	Body	CAST BRONZE	B62 CA826

International Shore Connections

DRAWING No. 568636

DWG. NO. 411610 1



FOR WASH DECK

No.	PART NAME	MATERIALS	WORK	REMARKS
8	ADAPTOR	B62		
7	PACKING	RUBBER	1	
6	PACKING	RUBBER	1	
5	FEMAIL CONNECT.	B62	1	
4	CONNECTION	B62	1	
3	BRANCH PIPE	B152	1	
2	NOZZLE JOINT	B62	1	
1	NOZZLE HEAD	B62	1	

φ40 JET NOZZLE
WITH ANSI HORN TYPE COUPLING

DRAWING No. 568652-WA

DESIGN DEPT | REMARKS

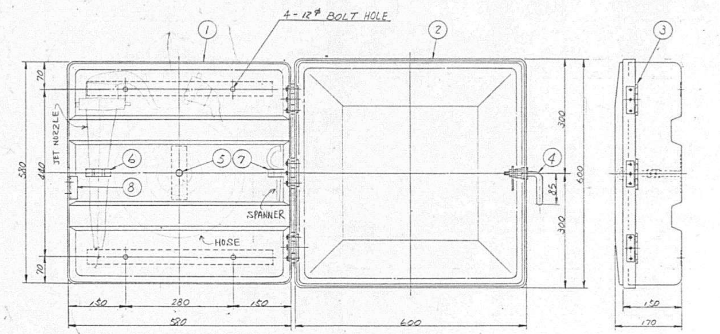
MANAGER | CHIEF | CHECKED | DRAWER

BODY TEST PRESSURE kg/cm²

SEAT TEST PRESSURE kg/cm²

UCHIYAMA SEISAKUSYO CO., LTD.

1649



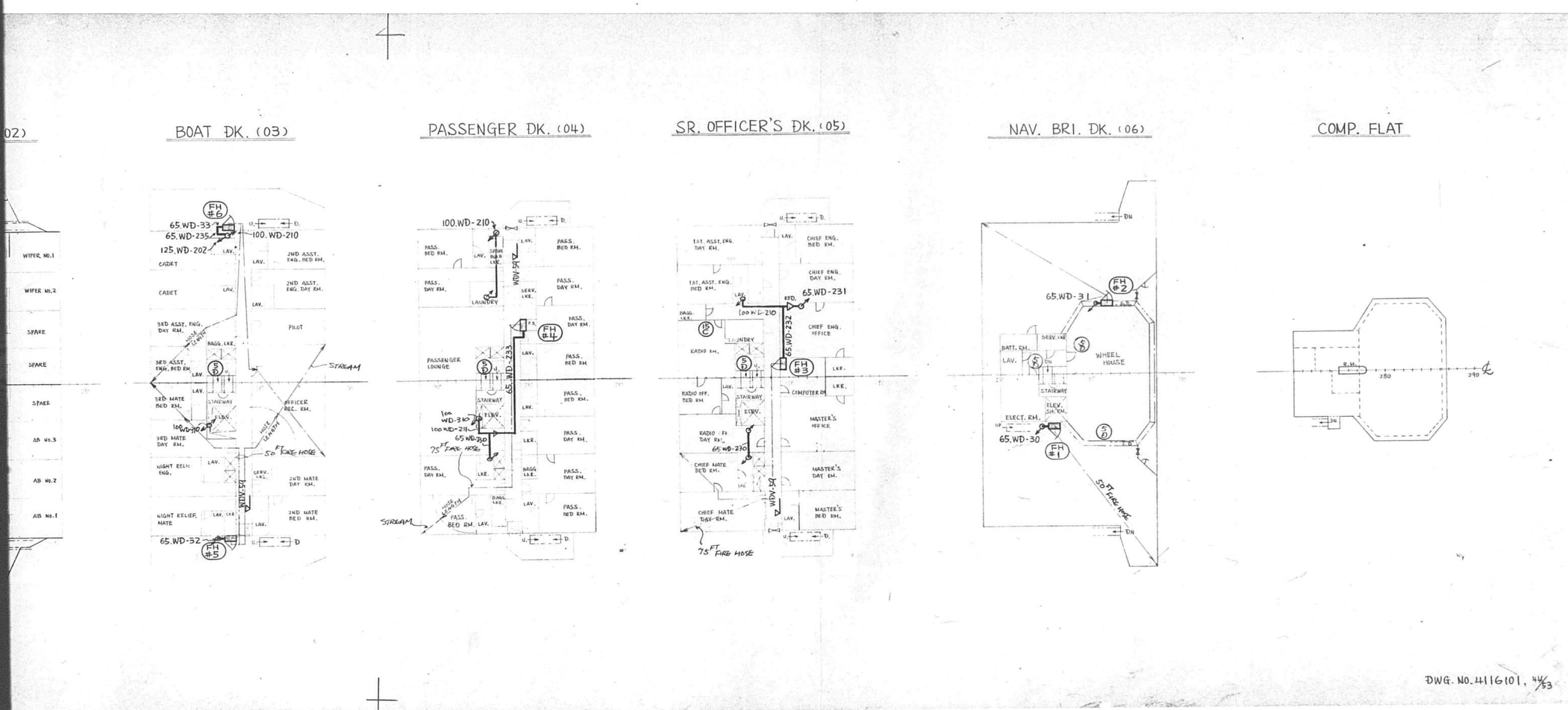
No.	DESCRIPTION	MATERIAL	REMARKS	No.	DESCRIPTION	MATERIAL	REMARKS
①	BODY	FRP		⑤	HOSE HANGER	JIS G 4303 SUS304	EQUIV. TO ASTM A276 TYPE 304
②	COVER	FRP		⑥	NOZZLE HOLDER	JIS G 4303 SUS304	A240 TYPE 304
③	HINGE	JIS G 4303 SUS304	EQUIV. TO ASTM A240 TYPE 304	⑦	SPANNER HOLDER	JIS G 4303 SUS304	A240 TYPE 304
④	HANDLE	JIS G 4303 SUS304	A276 TYPE 304	⑧	CATCH	JIS G 4303 SUS304	A240 TYPE 304

HOSE LOCKER FOR WASH DK.

LIST NO. WDV-55

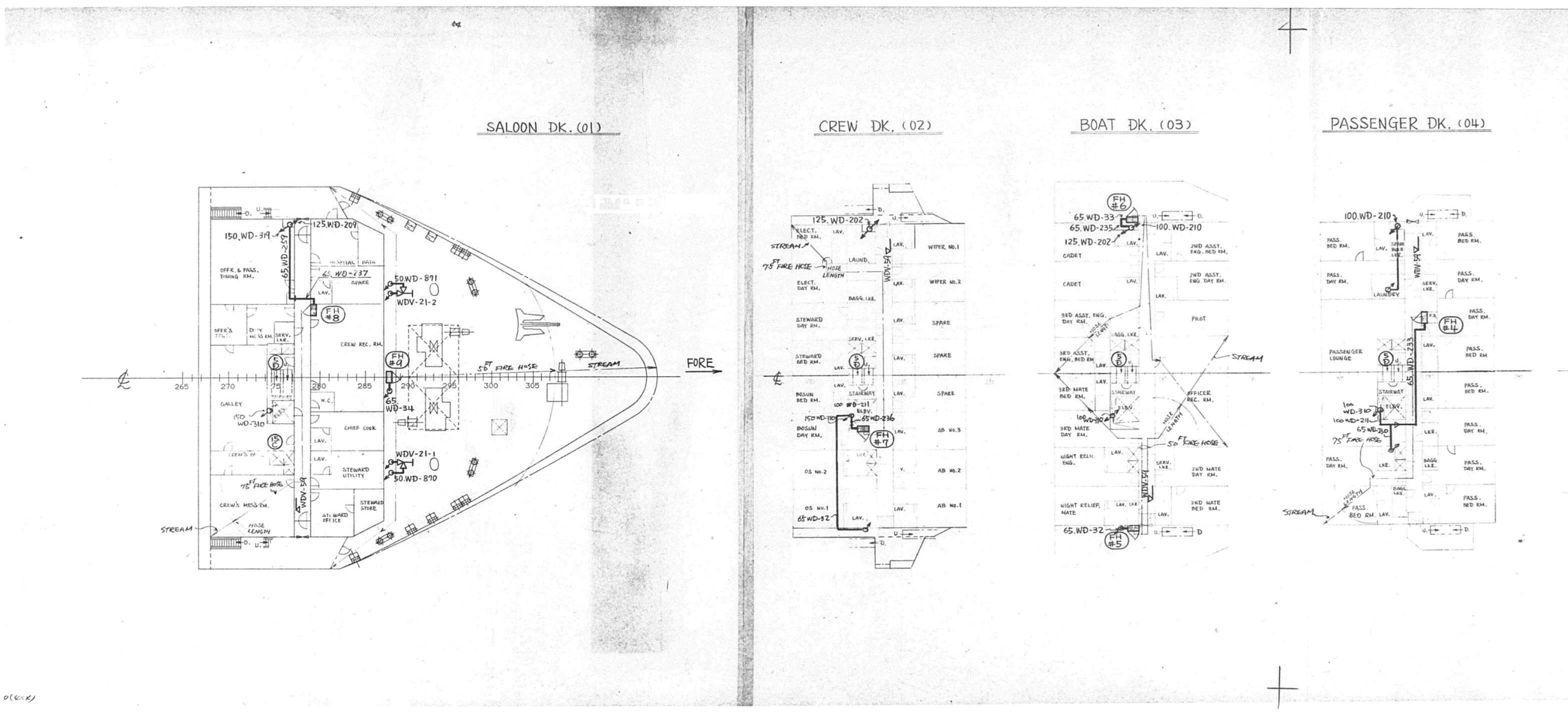
(TYPICAL)

DWG. NO. 4116101, 43/53



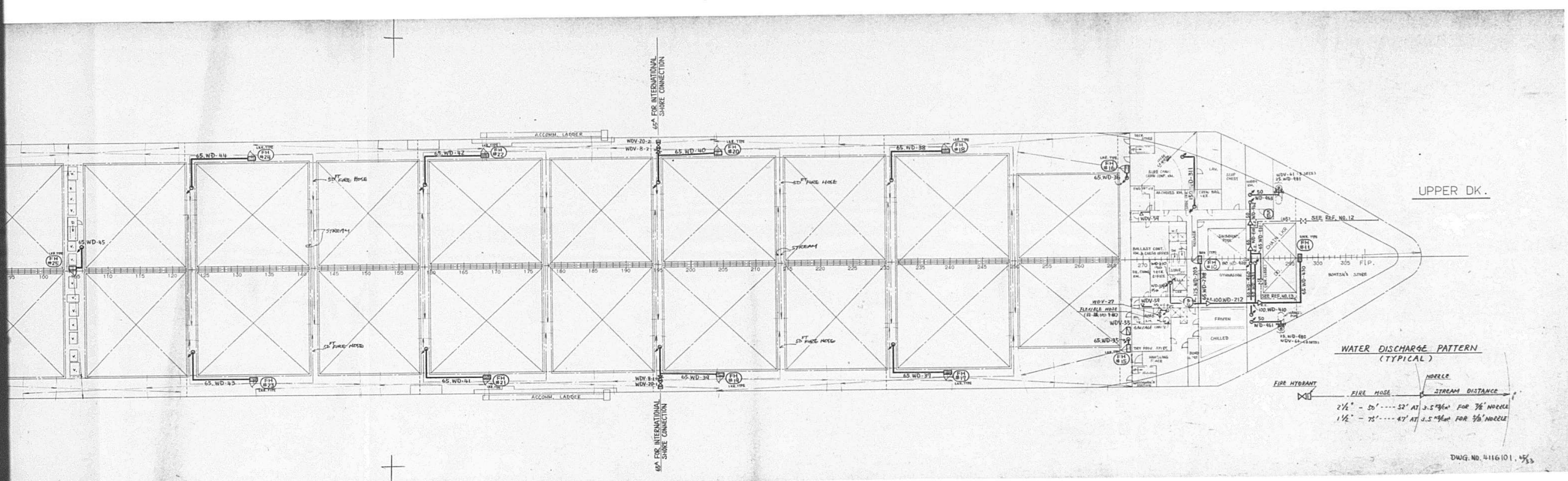
02)
BOAT DK. (03)
PASSENGER DK. (04)
SR. OFFICER'S DK. (05)
NAV. BRI. DK. (06)
COMP. FLAT
FH #6
65.WD-33
65.WD-235
100.WD-210
125.WD-202
STREAM
50 FT FIRE HOSE
65.WD-32
FH #5
100.WD-210
FH #4
65.WD-233
75 FT FIRE HOSE
STREAM
65.WD-231
100 WD-210
65.WD-232
FH #3
65.WD-230
75 FT FIRE HOSE
FH #2
65.WD-31
WHEEL HOUSE
65.WD-30
FH #1
50 FT FIRE HOSE
DWG. NO. 4116101. 44/53

1651

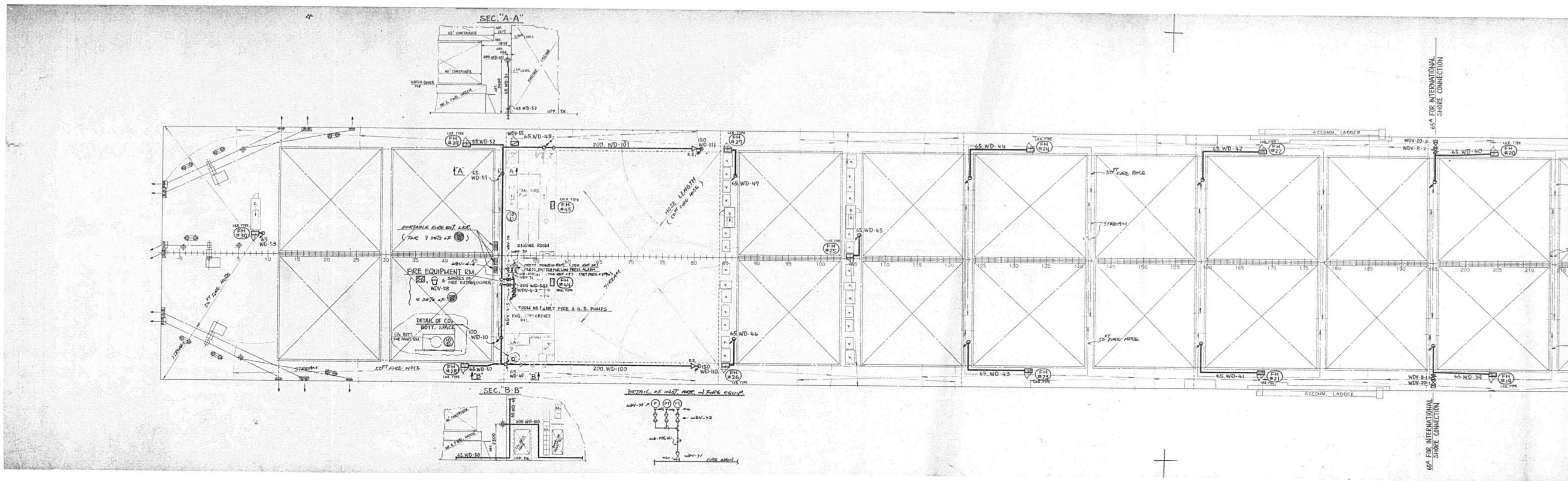

SALOON DK. (01)
CREW DK. (02)
BOAT DK. (03)
PASSENGER DK. (04)
FORE
STREAM
56FT FIRE HOSE
75FT FIRE HOSE
50FT FIRE HOSE
150.WD-319
125.WD-209
50WD-891
WDV-21-2
WDV-21-1
50.WD-890
65.WD-34
125.WD-202
65.WD-33
65.WD-235
125.WD-202
100.WD-210
65.WD-32
65.WD-236
100.WD-211
100.WD-210
65.WD-233
FH #4
FH #5
FH #6
FH #7
FH #8
FH #9
GALLEY
CREW'S MESS RM.
CHIEF COOK
STEWARD UTILITY
STEWARD STORE
CREW REC. RM.
WIPER NO. 1
WIPER NO. 2
SPARE
AB NO. 1
AB NO. 2
AB NO. 3
CADET
PILOT
PASSENGER LOUNGE
LAUNDRY
265
270
275
280
285
290
295
300
305

2/2

1652

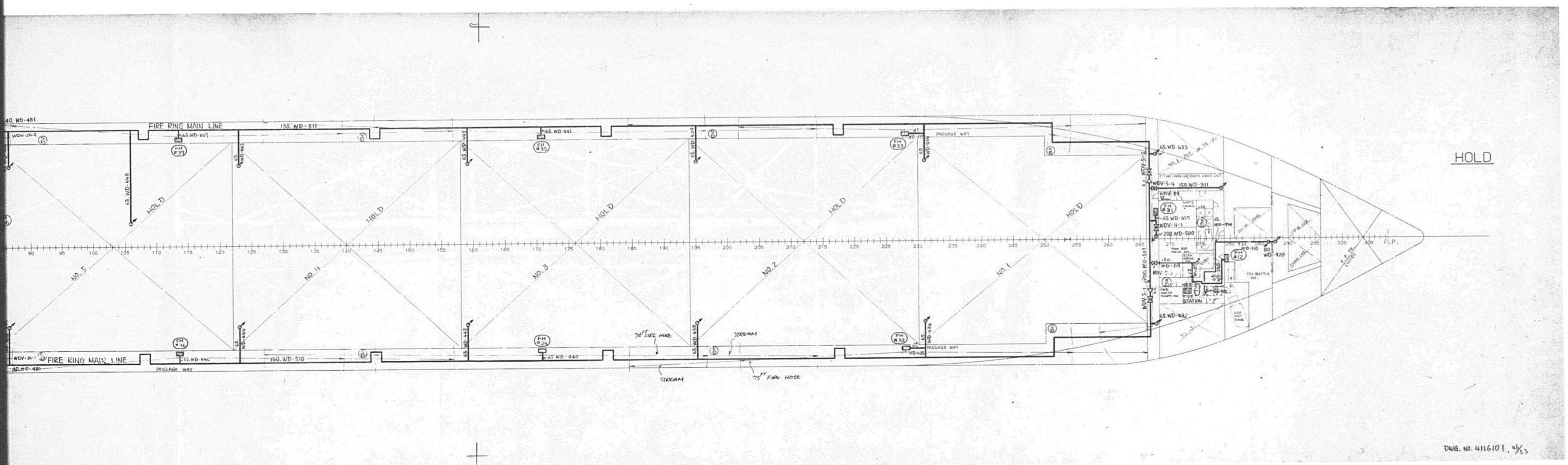

UPPER DK.
65A FOR INTERNATIONAL SHORE CONNECTION
ACCOMM. LADDER
WATER DISCHARGE PATTERN
(TYPICAL)
FIRE HYDRANT
FIRE HOSE
NOZZLE
STREAM DISTANCE
2½" - 50' ---- 52' AT 3.5 kg/cm² FOR 7/8" NOZZLE
1½" - 75' ---- 47' AT 3.5 kg/cm² FOR 5/8" NOZZLE
DWG. NO. 4116101, 45/53

1653

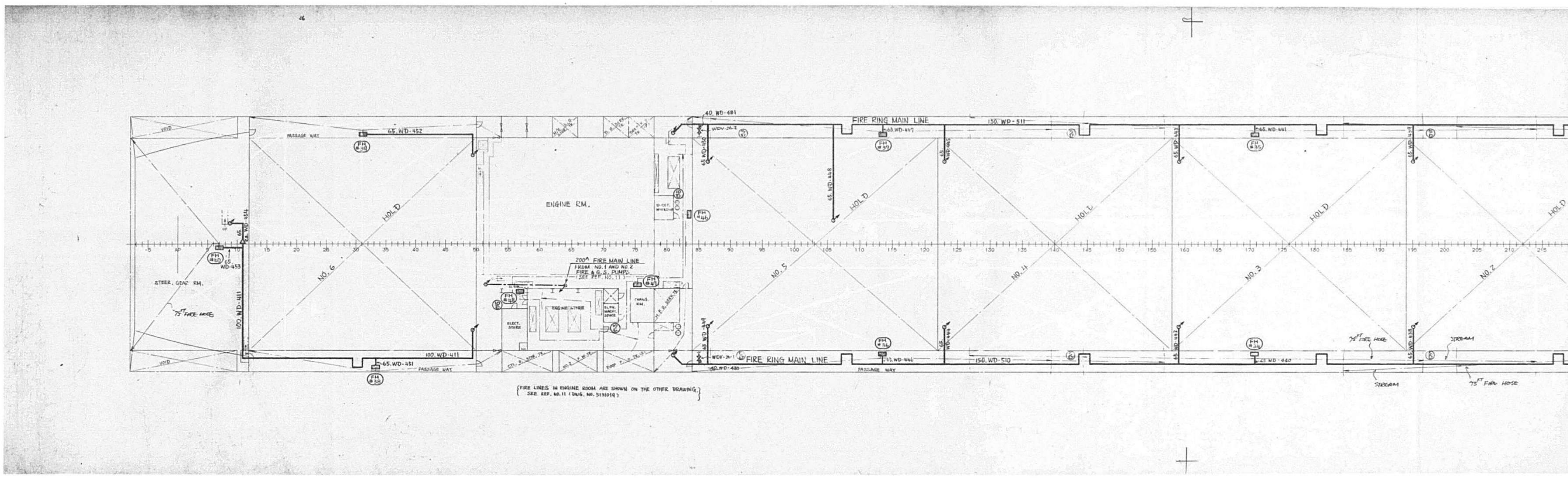


2/2

1654

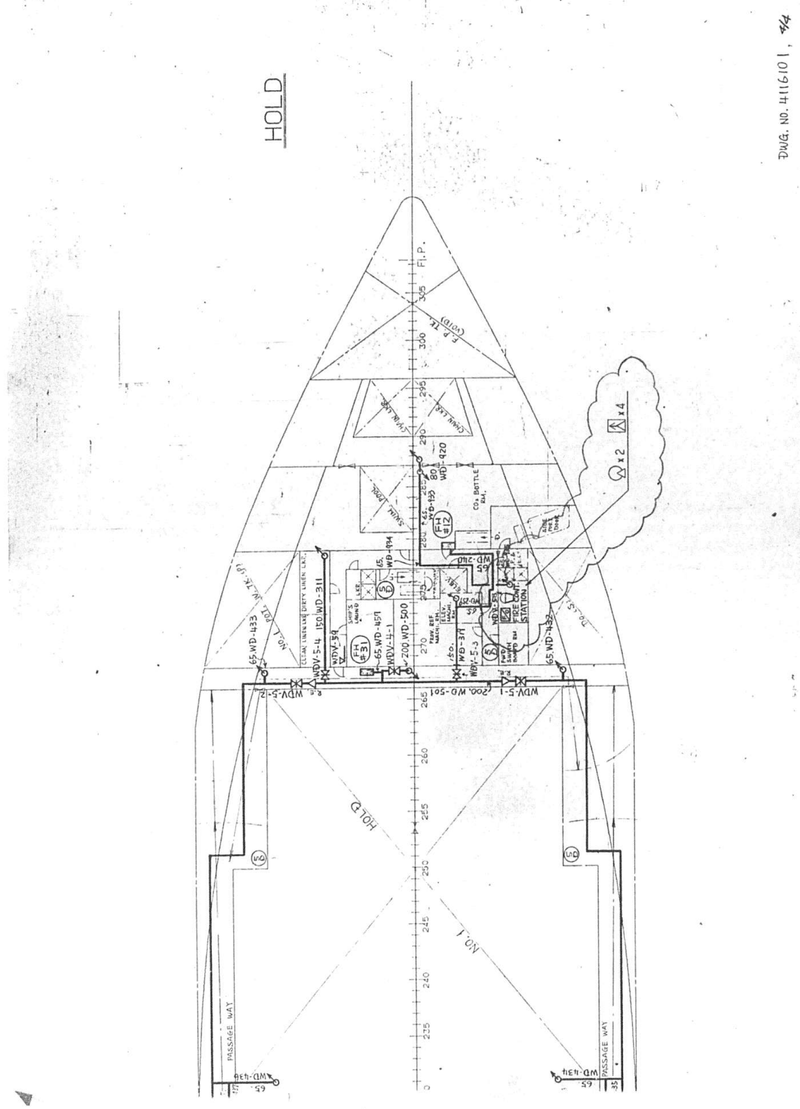

HOLD
FIRE RING MAIN LINE
150 WD-511
FIRE RING MAIN LINE
150 WD-510
HOLD
HOLD
HOLD
HOLD
HOLD
NO. 5
NO. 4
NO. 3
NO. 2
NO. 1
F.P.
DWG. NO. 4116101

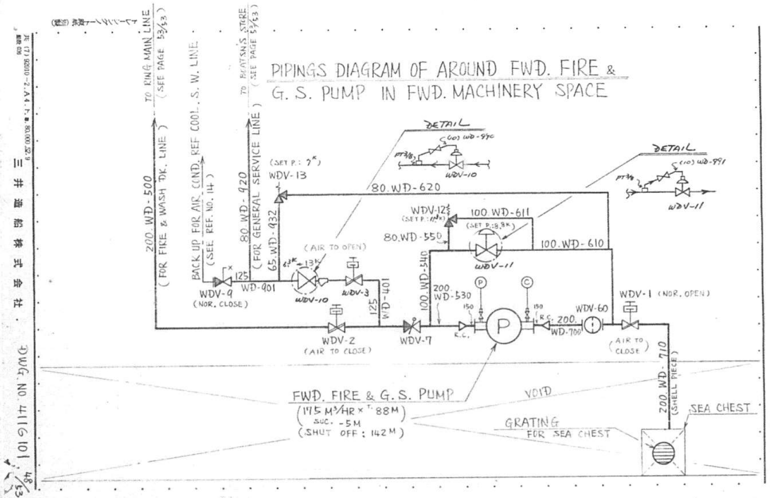
1/2 1655

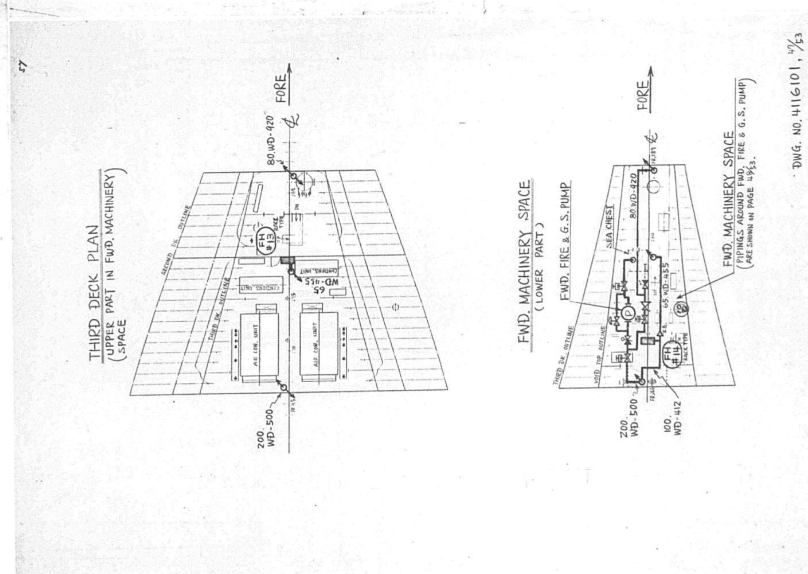

FIRE RING MAIN LINE
150 WD-511
HOLD
ENGINE RM.
NO. 6
NO. 5
NO. 4
NO. 3
NO. 2
STEER. GEAR RM.
PASSAGE WAY
100 WD-411
200A FIRE MAIN LINE
FROM NO.1 AND NO.2
FIRE & G.S. PUMPS
(SEE REF. NO. 11)
ENGINE STORE
ELECT. STORE
ELEV. MACH. SPACE
CHANG. RM.
FIRE RING MAIN LINE
150 WD-510
{FIRE LINES IN ENGINE ROOM ARE SHOWN ON THE OTHER DRAWING.
SEE REF. NO. 11 (DWG. NO. 5131019)}

2/2

1656


HOLD
DWG. NO. 4116101, 4/4
F.P.
HOLD
NO. 1
PASSAGE WAY
WDV-5-1
WDV-5-2
WDV-5-3
WDV-5-4
200 WD-501
200 WD-500
150 WD-311
65 WD-433
65 WD-432
80 WD-420
FIRE STATION


PIPINGS DIAGRAM OF AROUND FWD. FIRE &
G. S. PUMP IN FWD. MACHINERY SPACE
TO RING MAIN LINE (SEE PAGE 33/63)
200 WD-500 (FOR FIRE & WASH TK. LINE)
BACK UP FOR AIR CND. REF COOL. S. W. LINE (SEE REF. NO. 14)
80 WD-420 (FOR GENERAL SERVICE LINE)
65 WD-432
TO BOATSW'S STRE (SEE PAGE 53/63)
DETAIL
WDV-13
80 WD-620
WDV-12
100 WD-611
80 WD-550
WDV-11
100 WD-610
WDV-9 (NOR. CLOSE)
WD-401
WDV-10
WDV-3
(AIR TO OPEN)
WDV-2 (AIR TO CLOSE)
WDV-7
200 WD-530
100 WD-540
WDV-60
WDV-1 (NOR. OPEN)
(AIR TO CLOSE)
200 WD-710
FWD. FIRE & G.S. PUMP
(117.5 M³/HR × 88M)
SUC. -5M
(SHUT OFF : 142M)
VOID
GRATING FOR SEA CHEST
SEA CHEST
DWG. NO. 4116101


THIRD DECK PLAN
(UPPER PART IN FWD. MACHINERY SPACE)
FORE
80 WD-420
200 WD-500
FWD. MACHINERY SPACE (LOWER PART)
FWD. FIRE & G.S. PUMP
SEA CHEST
80 WD-420
65 WD-455
FWD. MACHINERY SPACE
PIPINGS AROUND FWD. FIRE & G.S. PUMP
200 WD-500
100 WD-412
DWG. NO. 4116101, 49/63

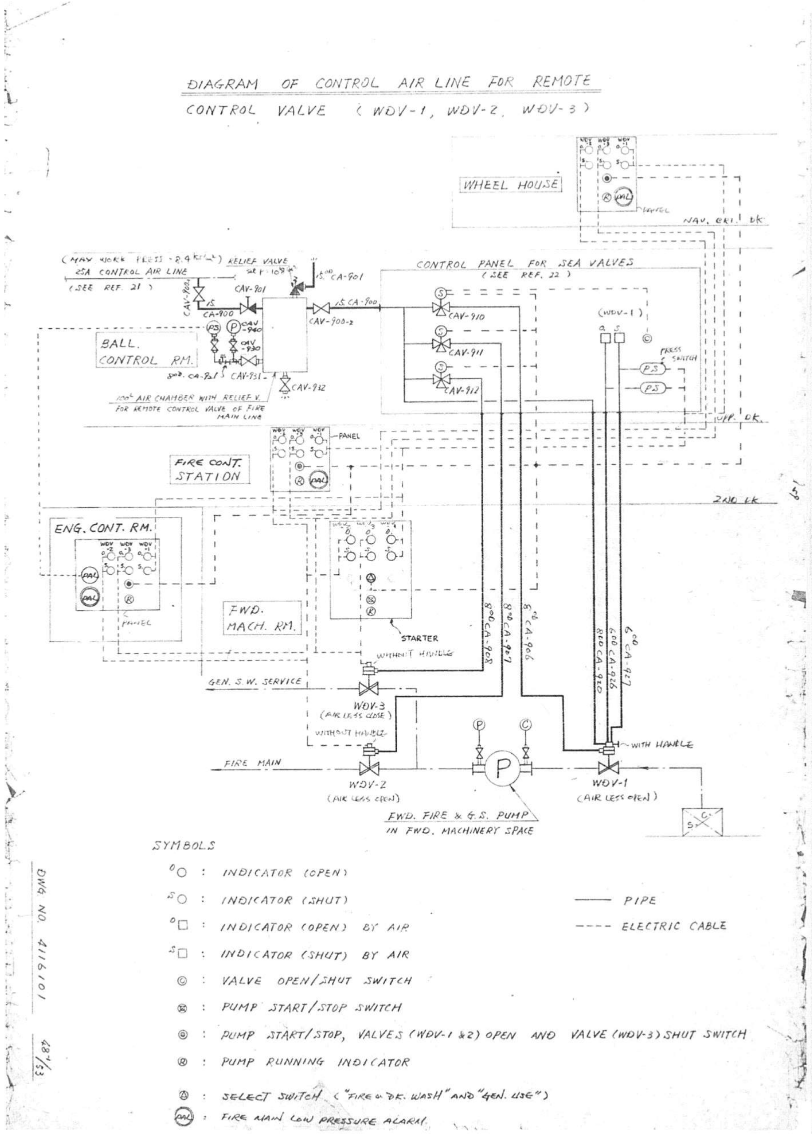
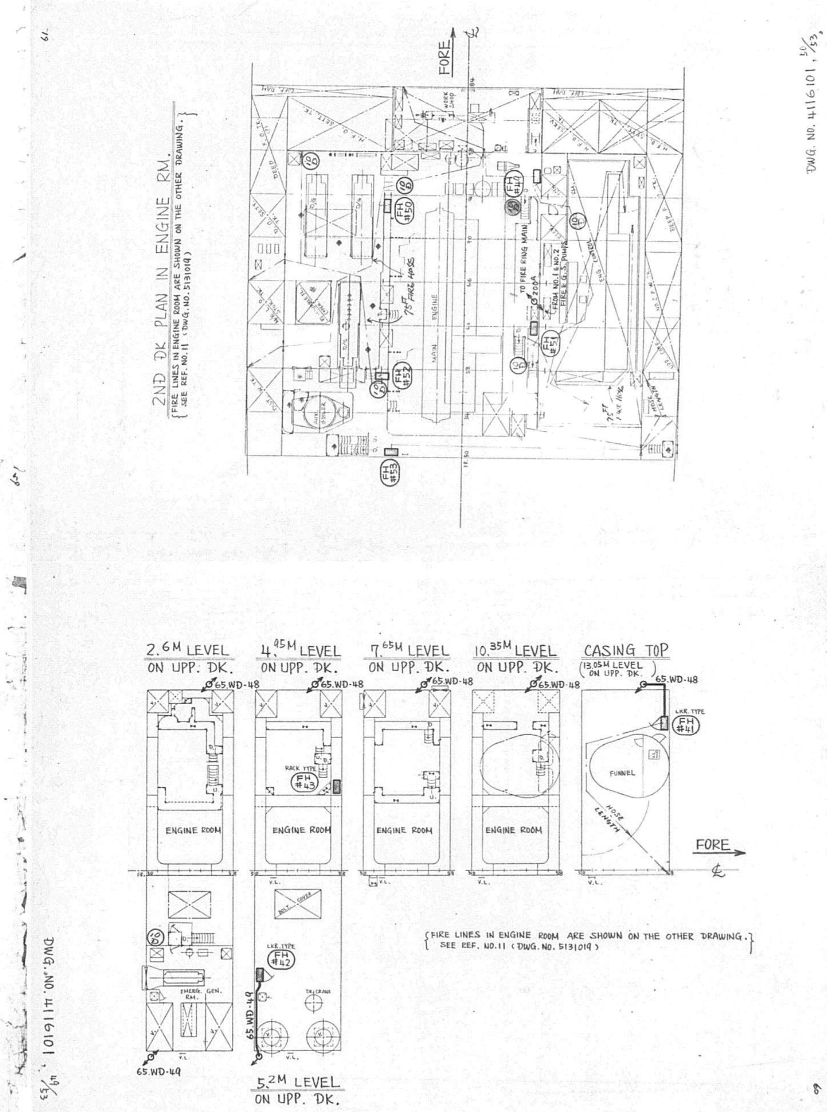
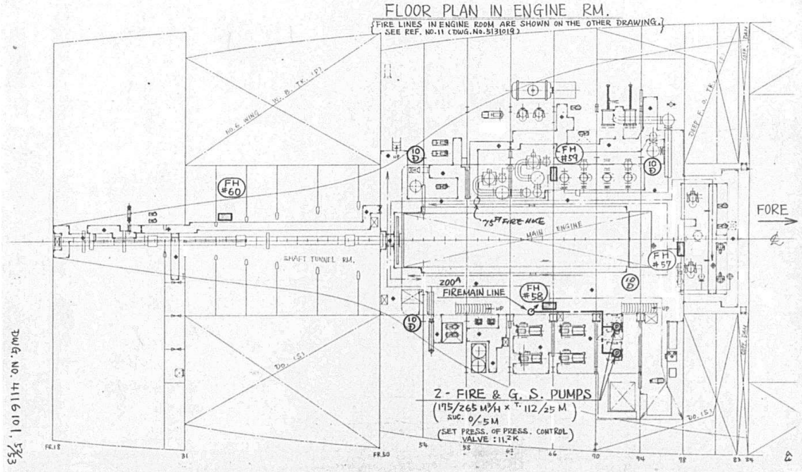


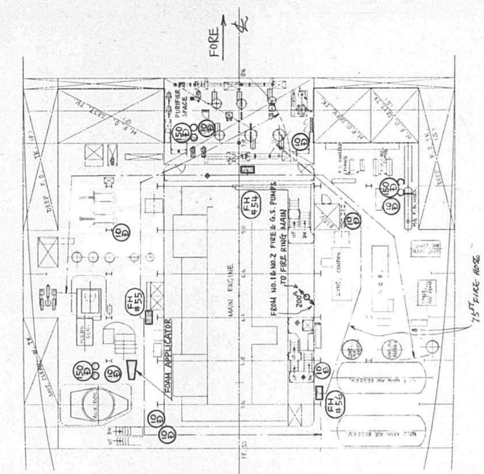
DIAGRAM OF CONTROL AIR LINE FOR REMOTE CONTROL VALVE (WDV-1, WDV-2, WDV-3)
WHEEL HOUSE
CONTROL PANEL FOR SEA VALVES
BALL. CONTROL RM.
FIRE CONT. STATION
ENG. CONT. RM.
FWD. MACH. RM.
STARTER
GEN. S.W. SERVICE
WDV-3
FIRE MAIN
WDV-2
WDV-1
FWD. FIRE & G.S. PUMP IN FWD. MACHINERY SPACE
SYMBOLS
INDICATOR (OPEN)
INDICATOR (SHUT)
INDICATOR (OPEN) BY AIR
INDICATOR (SHUT) BY AIR
VALVE OPEN/SHUT SWITCH
PUMP START/STOP SWITCH
PUMP START/STOP, VALVES (WDV-1 &2) OPEN AND VALVE (WDV-3) SHUT SWITCH
PUMP RUNNING INDICATOR
SELECT SWITCH ("FIRE & DK. WASH" AND "GEN. USE")
FIRE MAIN LOW PRESSURE ALARM
PIPE
ELECTRIC CABLE
DWG NO. 4116101

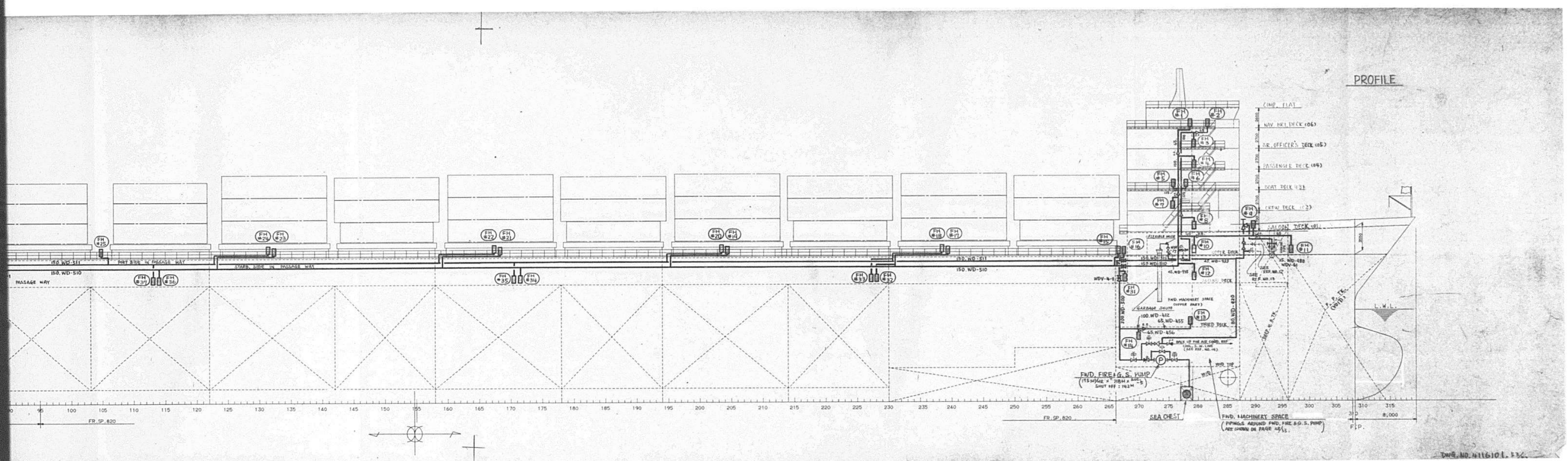

2ND DK PLAN IN ENGINE RM.
{FIRE LINES IN ENGINE ROOM ARE SHOWN ON THE OTHER DRAWING. SEE REF. NO.11 (DWG. NO. 5131019)}
FORE
DWG. NO. 4116101
2.6M LEVEL ON UPP. DK.
4.95M LEVEL ON UPP. DK.
7.65M LEVEL ON UPP. DK.
10.35M LEVEL ON UPP. DK.
CASING TOP (13.05M LEVEL ON UPP. DK.)
5.2M LEVEL ON UPP. DK.
ENGINE ROOM
FUNNEL
65.WD-48
65.WD-49
FORE

FLOOR PLAN IN ENGINE RM.
(FIRE LINES IN ENGINE ROOM ARE SHOWN ON THE OTHER DRAWING. SEE REF. NO.11 (DWG. No.5131019))



3RD DK. PLAN IN ENGINE RM.
(FIRE LINES IN ENGINE ROOM ARE SHOWN ON THE OTHER DRAWING. SEE REF. NO. 11 (DWG. NO. 5131019))





PROFILE
COMP. FLAT
NAV. BRI. DECK (06)
SR. OFFICER'S DECK (05)
PASSENGER DECK (04)
BOAT DECK (03)
CREW DECK (02)
SALOON DECK (01)
UPPER DECK
SECOND DECK
THIRD DECK
FWD. MACHINERY SPACE (UPPER PART)
GARBAGE SHUTE
FLEXIBLE HOSE
150. WD-511
150. WD-510
100. WD-412
65. WD-455
65. WD-456
WDV-4-1
L.W.L.
F.P. TK. (VOID)
FWD. FIRE & G.S. PUMP
SEA CHEST
FWD. MACHINERY SPACE
(PIPINGS AROUND FWD. FIRE & G.S. PUMP ARE SHOWN ON PAGE 48/53)
F.P.
PASSAGE WAY
PORT SIDE IN PASSAGE WAY
STARD. SIDE IN PASSAGE WAY
FR. SP. 820
DWG. NO. 4116101. 53/.

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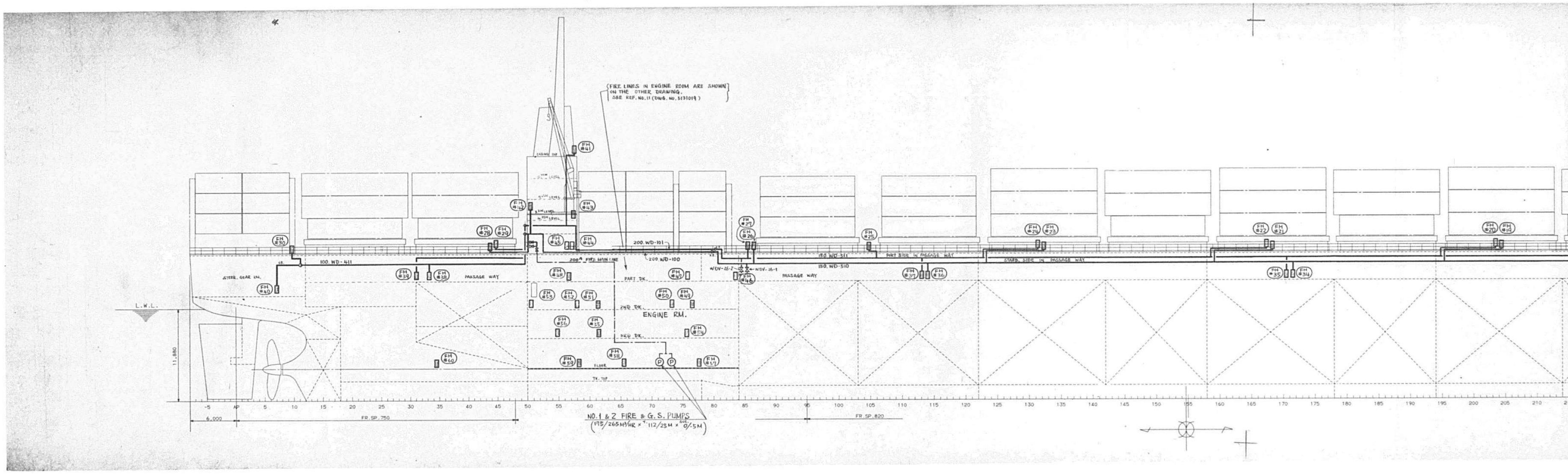

2/2

1661

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAR. 11 '85	OFTS/MAB/JS	APR. 19 '85	7-8-2	APR. 30 '85	
REV. 01	AUG. 6 '85	OTTS/MES-814	NOT RETURNED	—	OCT. 3 '85	
REV. 02	OCT. 8 '85	TAM/JS	NOV. 22 '85	7-8-2	NOV. 15 '85	

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

機関部
清水サービス管系図
F.W. SERVICE PIPING DIAGRAM
IN ENGINE ROOM

LYKES REF. NO. 480401 — MITSUI DRAWING NO. 5131023 — REV.

(14 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.No. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S.No. 1324 AND S.No. 1325.	JUN. 26 '86

DWG.NO. 5131023 1

5131023

2

GENERAL NOTE

DWG.NO. 5131023 page 2

3

REFERENCE

NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480001	4116002	PIPING PRACTICE
	190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
	482603	4116006	SPECIFICATION AND COMPARISON TABLE (JIS/ASTM) OF BOLTS & NUTS
	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
	482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
	482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
	482608	5131205	GASKET (GENERAL USE)
	482604	5233111	CAST STEEL VALVES
	482606	5233112	FORGED STEEL VALVES
	482607	5233114	BRONZE VALVES
	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES & COPPER NICKEL PIPES

DWG.NO. 5131023 page 3

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REFERENCE			
NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480201	5131001	FEED & CONDENSATE PIPING DIAGRAM IN ENG. RM
	481001	5131002	STEAM AND EXHAUST PIPING DIAGRAM IN ENG. RM
	480802	5131008	STEAM DRAIN PIPING DIAGRAM IN ENG. RM
	481401	5131009	L.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481402	5131012	L.O. TRANSFER & PURIFICATION PIPING DIAGRAM IN ENG. RM
	481501	5131013	F.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481509	5131014	F.O. TRANSFER PIPING DIAGRAM IN ENG. RM
	481502	5131015	F.O. PURIFICATION PIPING DIAGRAM IN ENG. RM
	480403	5131016	COOLING F.W. PIPING DIAGRAM IN ENG. RM
	480501	5131018	COOLING S.W. & S.W. SERVICE PIPING DIAGRAM IN ENG. RM
	480301	5131019	FIRE G.S. & BALLAST PIPING DIAGRAM IN ENG. RM
	480102	5131020	BILGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENG. RM
	480401	5131023	F.W. SERVICE PIPING DIAGRAM IN ENG. RM
	481802	5131024	COMPRESSED AIR PIPING DIAGRAM IN ENG. RM
	481803	5131025	CONTROL AIR PIPING DIAGRAM IN ENG. RM
	481806	5131026	MAIN ENGINE REMOTE CONTROL AIR PIPING DIAGRAM IN ENG. RM
	520001	5131030	EXHAUST GAS PIPING DIAGRAM IN ENG. RM
	480901	4116701	DIAGRAM OF AIR SOUNDING & FILLING PIPES
	480801	4116601	ARRANGEMENT OF EXPOSED DECK SCUPPER PIPES (INCLUDE. REF. CONT. DRAIN PIPES)
	480402	4116401	DIAGRAM OF FRESH, HOT, POTABLE, SEA WATER & STEAM PIPE FOR ACCOMM. USE

5131023

CODED GROUP SYSTEM OF PIPING DIAGRAM

区分 (DIVISION) / 管系 (SYSTEM)	記号および番号 (DIVISION OF SYMBOL NUMBER) 管 (PIPE)	弁.コック.こし器 (VALVE.COCK)
清水サービス, 飲料水 および 温水管系図 F.W. SERVICE, DRINKING & HOT WATER	1F-1 ~ 999	1FV-1 ~ 999
開放清水管系 OPEN FRESH WATER DRAIN	6F-1 ~ 999	6FV-1 ~ 999
排水管系 (汚水管系も含む) OPEN BILGE (INCLUDING SEWAGE)	9W-1 ~ 999	9WV-1 ~ 999

5131023

SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT
		GATE (SLUICE) VALVE	:BUTT OR SOCKET WELDING ENDED
		BUTTERFLY VALVE	:UNION ENDED
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	:LOCKED CLOSE
		SCREW DOWN CHECK VALVE	:LOCKED OPEN
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE;
		PRESS. REDUCING VALVE DIRECT OPERATING TYPE	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
		BACK FLOW PREVENTER	
		ANGLE STORM VALVE	
COCK		TWO-WAY COCK	:LOCKED CLOSE
		THREE-WAY COCK	:LOCKED OPEN
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER
		PISTON TYPE (ON-OFF CONTROL)	:WITH POSITIONER
		PISTON TYPE (OPEN DEGREE CONTROL)	:WITH MANUAL HANDLE
		ELECTRIC MOTOR TYPE	
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS.-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	●:WITH STOP VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	○:WITHOUT VALVE; :WITH SELF CLOSING VALVE
		FLAT GLASS LEVEL GAUGE	
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE;
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	TANK
	L	LEVEL INDICATOR	
	VS	VISCOSITY INDICATOR	
	P	PRESSURE GAUGE	
	C	COMPOUND GAUGE	
	V	VACUUM GAUGE	
		DIFF. PRESS. GAUGE	
	T	THERMOMETER	
	T	REMOTE THERMOMETER	
	F	FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETECTOR		PRESSURE SWITCH	
		TEMPERATURE SWITCH	
		LEVEL (FLOAT) SWITCH	
		FLOW SWITCH	
		SALINITY CELL	
		ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
		MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

KIND	SYMBOL	NAME	REMARK
SAMPLE		---SYMBOL ---INSTRUMENT NO.	
INDICATOR	PI	PRESSURE INDICATOR	
	VI	VACUUM INDICATOR	
	CI	COMPOUND INDICATOR	
		DIFF. PRESS. INDICATOR	
	TI	TEMPERATURE INDICATOR	
	LI	LEVEL INDICATOR	
		VISCOSITY INDICATOR	
		DENSITY INDICATOR	
		SALINITY INDICATOR	
	FI	FLOW INDICATOR	
	XI	OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL	PC	PRESSURE CONTROL	
	TC	TEMPERATURE CONTROL	
	LC	LEVEL CONTROL	
		VISCOSITY CONTROL	
	AC	AUTOMATIC CONTROL	
		EMER. SHUT DOWN	
		EMER. SLOW DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		AUTOMATIC START	
		AUTOMATIC STOP	
		AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM		HIGH PRESSURE ALARM	
		LOW PRESSURE ALARM	
		HIGH DIFF. PRESS. ALARM	
		HIGH TEMPERATURE ALARM	
		LOW TEMPERATURE ALARM	
		TEMP. DEVIATION HIGH ALARM	
		HIGH LEVEL ALARM	
		LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		HIGH VISCOSITY ALARM	
		LOW VISCOSITY ALARM	
		HIGH DENSITY ALARM	
		HIGH SALINITY ALARM	
		OVER FLOW ALARM	
		NON FLOW ALARM	
		GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

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5131023

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131023

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
DISTILLED WATER LINE (IF-301~350)	40	1½	45	2.0	SEAMLESS DRAWN COPPER PIPE C1220T-½H JIS H 3300 (EQUIVALENT TO ASTM B88 C12200-H)	JIS 10K (143psi)	CAST BRONZE FLANGE WITH HUB BC 7 JIS H 5111 (EQUIVALENT TO ASTM B61)	JIS 16K (228psi)	CAST BRONZE FLANGED BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC; CAST BRONZE BC 6 JIS H 5111 (EQUIVALENT To ASTM B62) STEM; STAINLESS STEEL SUS 304 JIS G 4304 (EQUIVALENT To ASTM A276 TYPE 304)	JIS 10K (143psi)	SOCKED PIECE MADE OF SEAMLESS COPPER PIPE (BRAZING)	80°C (176°F)	3.5K (50psi)
HOT WATER LINE (IF-351~400)	32	1¼	35	2.0									85°C (185°F)	6.5K (92psi)
	25	1	30	2.0										
	20	¾	25	1.8										
	15	½	20	1.8										
POTABLE WATER LINE (IN ENG. RM) (IF-201~300)	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE (C1220T-0 JIS H 3300 ASTM B88 C12200-0)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC 6 JIS H 5111 (EQUIVALENT To ASTM B62)	DISC & STEM; CAST BRONZE BC 6 JIS H 5111 (EQUIVALENT To ASTM B62)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	38°C (100°F)	6K (85psi)
	6	¼	8.0	1.2										
F.W. TRANSFER LINE (FOR POTABLE W.) (IF-151~200)														3K (43psi)
F.W. SERV. LINE (IF-1~67 IF-66~150)														6K (85psi)

5131023

8

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131023

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
AIR VENT PIPE FOR TANK (EXPOSED DECK) (6F-101~120) (9W-601~650)	65	2½	76.3	7.0	WELDED CARBON STEEL PIPE STPG38-E Sch 80 JIS G 3454 (EQUIVALENT TO ASTM A53 Gr.A) GALVANIZED	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)	JIS 10K (143psi)	AIR PIPE HEAD DUCTILE CAST IRON FCD 45 (EQUIVALENT TO ASTM A395)	—	—	—	38°C (100°F)	0K (0psi)
	50	2	60.5	5.5										
	40	1½	48.6	5.1										
SEWAGE OVERBOARD DIS. LINE (9W-651~700)									CAST STEEL FLANGED SC 46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT; STAINLESS STEEL SCS 13 JIS G 5121 (EQUIVALENT TO ASTM A351 CF8) OR CAST BRONZE BC6 (ASTM B62)		SHEEL PIECE SEAMLESS STEEL PIPE STS 38-S JIS G 3455 FOR 50* (O.D. 76.3*×11*) (EQUIVALENT TO ASTM A106 Gr.A)	38°C (100°F)	3.5K (50psi)
ENGINE CONFERENCE ROOM DRAIN (6F-91~100)														0K (0psi)

5131023

10

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131023

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
F.W. SERVICE LINE (GENERAL SERVICE) (IF-48~65)	125	5	139.8	6.6	WELDED CARBON STEEL PIPE STPG 38 E Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)	JIS 10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT; CAST BRONZE BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62) OR STAINLESS STEEL SCS 13 JIS G 5121 (EQUIVALENT TO ASTM A351 CF8) STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT To ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE GALVANIZED	38°C (100°F)	6K (85psi)
	100	4	114.3	6.0										
	80	3	89.1	5.5										
~~F.W. TRANSFER LINE~~ ~~(FOR POTABLE W.)~~ ~~(IF-151~200)~~	65	2½	76.3	5.2										~~3K (43psi)~~
	50	2	60.5	3.9										
	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC 6 JIS H 5111 (EQUIVALENT To ASTM B62)					
	32	1¼	42.7	3.6										
~~POTABLE WATER LINE~~ ~~(IN ENG. RM)~~ ~~(IF-201~300)~~	25	1	34.0	3.4										~~6K (85psi)~~
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-0 JIS H 3300 (EQUIVALENT TO ASTM B88 C12200-0)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC 6 JIS H 5111 (EQUIVALENT To ASTM B62)	DISC & STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)		
	6	¼	8.0	1.2										

5131023

7

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131023

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
F.W. OPEN DRAIN & AIR VENT LINE (6F-1~90) (6F-151~200)	125	5	139.8	6.6	WELDED CARBON STEEL PIPE STPG 38 E Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA) GALVANIZED	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36) OR BUTT WELDING OR SLEEVE JOINT	JIS 10K (143psi)	CAST STEEL FLANGED SC 46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT; STAINLESS STEEL SCS 13 JIS G 5121 (EQUIVALENT TO ASTM A351 CF8) OR CAST BRONZE BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62) STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE GALVANIZED	38°C (100°F)	0K (0psi)
	100	4	114.3	6.0										
SEWAGE HOLDING TANK AIR VENT (9W-551~600)	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC; BC 6 (EQUIVALENT TO ASTM B62) STEM; SUS 304 (EQUIVALENT TO ASTM A276 TYPE 304)				
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
SEWAGE LINE (IN ENG. RM) (9W-501~550)	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-0 JIS H 3300 (EQUIVALENT TO ASTM B88 C12200)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC & STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)		0~3.5K (0~50psi)
	6	¼	8.0	1.2										

5131023

9

SLEEVE JOINT

According to the yard's standard practice,
Welding sleeve joints may be used with the limitation as mentioned hereafter.

1 Piping system to be applied

~~Exhaust steam line~~
~~Steam drain line (5D)~~
~~Exhaust gas line~~
~~Condensate water line~~

All air vent line { (6F-101~120, 9W-601~650) / (6F-1~100, 9W-551~600) }
All open ended drain line (6F-1~100,)
Apen bilge scupper line

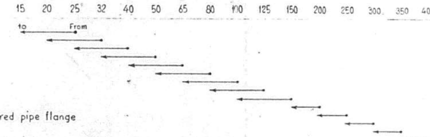
2 Nominal diameter of the pipe
15 mm and over

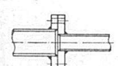
Reducing method of pipe diameter

In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the difference of pipe size is within the following limits. → *Irregulaly bored pipe flanges shall only be used for vent piping, air piping and scupper pipe line.*

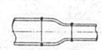
Nominal size of pipes in mm. 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400



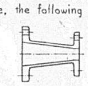


Irregularly bored pipe flange

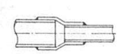
2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.



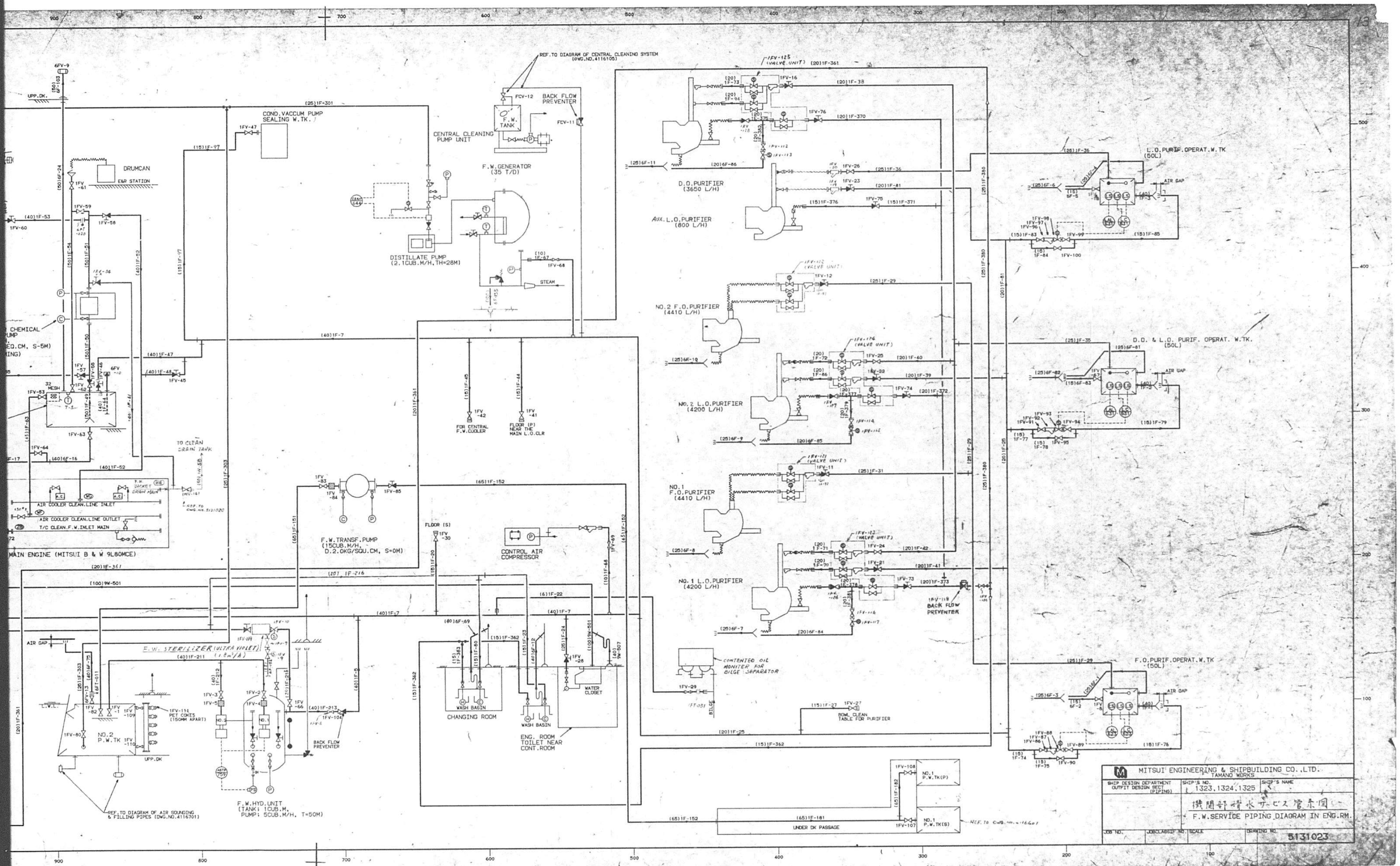
Butt welding concentric reducer.



Flange ended reducer

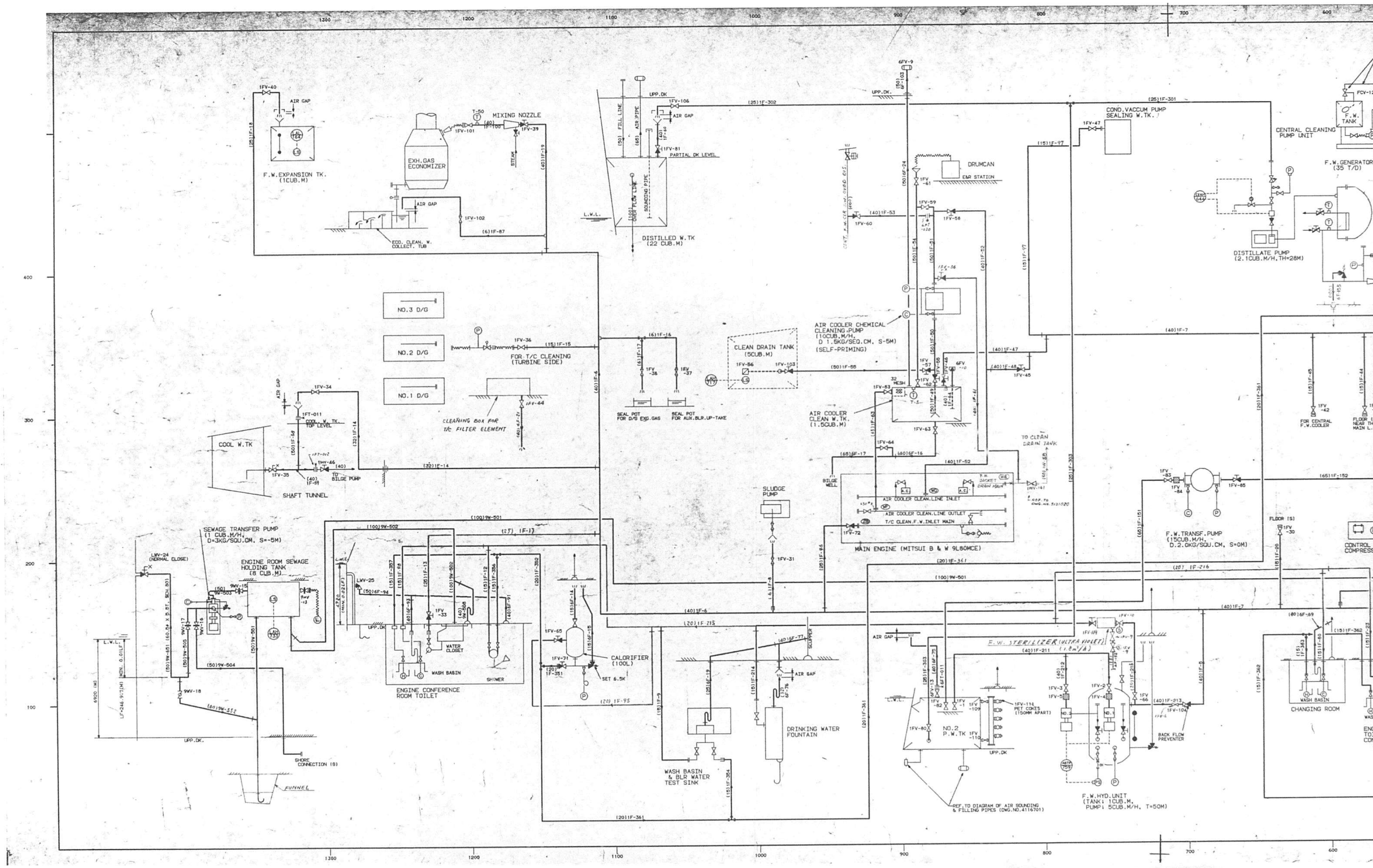


Braising reducer



REF. TO DIAGRAM OF CENTRAL CLEANING SYSTEM (DWG.NO.4116105)
BACK FLOW PREVENTER
F.W. TANK
CENTRAL CLEANING PUMP UNIT
COND. VACCUM PUMP SEALING W.TK.
DRUMCAN
E&R STATION
F.W. GENERATOR (35 T/D)
DISTILLATE PUMP (2.1CUB.M/H, TH=28M)
STEAM
D.O. PURIFIER (3650 L/H)
AUX. L.O. PURIFIER (800 L/H)
L.O. PURIF. OPERAT. W.TK (50L)
AIR GAP
NO.2 F.O. PURIFIER (4410 L/H)
NO.2 L.O. PURIFIER (4200 L/H)
D.O. & L.O. PURIF. OPERAT. W.TK. (50L)
NO.1 F.O. PURIFIER (4410 L/H)
NO.1 L.O. PURIFIER (4200 L/H)
FOR CENTRAL F.W. COOLER
FLOOR (P) NEAR THE MAIN L.O. CLR
TO CLEAN DRAIN TANK
AIR COOLER CLEAN. LINE INLET
AIR COOLER CLEAN. LINE OUTLET
T/C CLEAN. F.W. INLET MAIN
MAIN ENGINE (MITSUI B & W 9L80MCE)
F.W. TRANSF. PUMP (15CUB.M/H, D.2.0KG/SQU.CM, S=0M)
FLOOR (S)
CONTROL AIR COMPRESSOR
BACK FLOW PREVENTER
F.W. STERILIZER (ULTRA VIOLET)
AIR GAP
NO.2 P.W.TK
PET COKES (150MM APART)
UPP.DK
F.W. HYD. UNIT (TANK: 1CUB.M, PUMP: 5CUB.M/H, T=50M)
REF. TO DIAGRAM OF AIR SOUNDING & FILLING PIPES (DWG.NO.4116701)
WASH BASIN
CHANGING ROOM
ENG. ROOM TOILET NEAR CONT. ROOM
WATER CLOSET
CONTENTED OIL MONITOR FOR BILGE SEPARATOR
BOWL CLEAN TABLE FOR PURIFIER
F.O. PURIF. OPERAT. W.TK (50L)
NO.1 P.W.TK(P)
NO.1 P.W.TK(S)
UNDER DK PASSAGE
MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT OUTFIT DESIGN SECT. (PIPING)
SHIP'S NO. 1323, 1324, 1325
SHIP'S NAME
機関室清水サービス管系統図
F.W. SERVICE PIPING DIAGRAM IN ENG. RM.
JOB NO.
SCALE
DRAWING NO. 5131023

1/2 1667


F.W.EXPANSION TK.
(1CUB.M)
MIXING NOZZLE
EXH.GAS
ECONOMIZER
AIR GAP
ECO. CLEAN. W.
COLLECT. TUB
DISTILLED W.TK
(22 CUB.M)
PARTIAL DK LEVEL
FILL LINE
AIR PIPE
SOUNDING PIPE
L.W.L.
UPP.DK.
DRUMCAN
E&R STATION
COND.VACCUM PUMP
SEALING W.TK.
CENTRAL CLEANING
PUMP UNIT
F.W. TANK
F.W.GENERATOR
(35 T/D)
DISTILLATE PUMP
(2.1CUB.M/H,TH=28M)
NO.3 D/G
NO.2 D/G
NO.1 D/G
FOR T/C CLEANING
(TURBINE SIDE)
SEAL POT
FOR D/G EXG.GAS
SEAL POT
FOR AUX.BLR.UP-TAKE
CLEAN DRAIN TANK
(5CUB.M)
AIR COOLER CHEMICAL
CLEANING PUMP
(10CUB.M/H,
D 1.5KG/SQ.CM, S=5M)
(SELF-PRIMING)
AIR COOLER
CLEAN W.TK.
(1.5CUB.M)
TO CLEAN
DRAIN TANK
COOL W.TK
SHAFT TUNNEL
TO
BILGE PUMP
BILGE
WELL
AIR COOLER CLEAN.LINE INLET
AIR COOLER CLEAN.LINE OUTLET
T/C CLEAN.F.W.INLET MAIN
MAIN ENGINE (MITSUI B & W 9L80MCE)
SLUDGE
PUMP
F.W.TRANSF.PUMP
(15CUB.M/H,
D.2.0KG/SQ.CM, S=0M)
FOR CENTRAL
F.W.COOLER
CONTROL AIR
COMPRESSOR
SEWAGE TRANSFER PUMP
(1 CUB.M/H,
D=3KG/SQU.CM, S=-5M)
ENGINE ROOM SEWAGE
HOLDING TANK
(8 CUB.M)
WATER
CLOSET
WASH BASIN
SHOWER
ENGINE CONFERENCE
ROOM TOILET
CALORIFIER
(100L)
SET 6.5K
WASH BASIN
& BLR WATER
TEST SINK
DRINKING WATER
FOUNTAIN
F.W. STERILIZER (ULTRA VIOLET)
NO.2
P.W.TK
PET COKES
(500MM APART)
BACK FLOW
PREVENTER
F.W.HYD.UNIT
(TANK: 1CUB.M,
PUMP: 5CUB.M/H, T=50M)
REF.TO DIAGRAM OF AIR SOUNDING
& FILLING PIPES (DWG.NO.4116701)
CHANGING ROOM
SHORE
CONNECTION (S)
FUNNEL
FLOOR (S)

2/2

1668

1/33

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS (N.O.) DATE	ABS (N.O.) LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	MAY 28 85	OFTS/MES-428	MAY 23, 85	JRN/YS T-8-2	APR. 30. 85	—

FINISHED PLAN

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SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP'S NO. 1325 SHIP'S NAME TILLIE LYKES

居住区
清水, 温水, 飲料水, 海水 及び
蒸気管系統図

DIAGRAM OF FRESH, HOT, POTABLE, SEA WATER & STEAM PIPE FOR ACCOMM. USE

(TEL 2235)

JOB NO. TS1323/4/5
LYKES REF. NO. 480402
MITSUI DRAWING NO. 4116401

(33 SHEETS WITH COVER)

2

PLAN RECORD

REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5 OCT 1986	PREPARED FOR S.NO.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO. 1324 AND S.NO. 1325	S. Nishigaki

3

GENERAL NOTE

1. ALL STEEL PIPES SHALL BE GALVANIZED. (EXCEPT STEAM PIPE LINE)
2. FRESH WATER (POTABLE) PIPES WHICH ARE ARRANGED BETWEEN TNF PANEL AND EXPOSED STEEL WALL SHALL BE INSULATED IN ORDER TO AVOID FREEZING

DWG.NO. 4116401

4

REFERENCE DRAWING

NO.	LYKES REF. NO.	DWG. NO.	DWG. NAME
1	481801	4117401	DIAGRAM OF VOICE TUBE & COMPRESSED AIR LINES
2	482610	4116402	DIAGRAM OF REMOTE CONT. AIR PIPING FOR SEA VALVE IN FWD. MACH. SP.
3	260102	4101401	DIAGRAM OF HYD. OIL PIPE FOR DECK MACHINERY
4	480302	4116101	DIAGRAM OF FIRE & WASH DECK LINE
5	480701	4116501	DIAGRAM OF DRAIN AND SOIL PIPE FOR ACCOMMODATION SPACE
6	480404	4116411	CALORIFIER
7	360301	4116412	WATER STERILIZER
8			
9	360101	4111501	PLUMBING FIXTURE
10	480001	4116002	PIPING PRACTICE
11	480401	5131023	FRESH WATER SERVICE PIPING DIAG. IN ENG. RM.
12	482407	5233114	BRONZE VALVES
13	482409	5233111	CAST STEEL VALVES
14	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES & COPPER NICKEL PIPES
15	482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACH. SP.)
16	380202	4116417	STEAM RADIATOR
17	480407	4116418	PRESS. REDUCING AND RELIEF VALVE
18	482434	4116405	BUTTERFLY VALVES IN FWD. MACH. SPACE AND FOR ACCOMM. SP. (EXCEPT ATTACHED ON VESSEL'S HULL)
19	480802	5131008	STEAM DRAIN PIPING DIAGRAM IN ENGINE ROOM
20	481001	5131002	STEAM & EXH'T PIPING DIAGRAM IN ENGINE ROOM
21	480901	4116701	DIAGRAM OF AIR, SOUNDING & FILLING PIPES
22	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
23	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
24	482603	4116006	SPECIFICATION AND COMPARISON TABLE (JIS/ASTM) OF BOLT & NUTS

DWG.NO. 4116401

1669

5

REFERENCE DRAWING			
NO.	LYKES REF. NO.	DWG. NO.	DWG. NAME
25	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
26	482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYS. (GEN. PIPING)
27	482413	5233212	STEAM TRAP
28	482435	4116406	REMOTE CONTROL BUTTERFLY VALVES FOR SEA VALVES IN FWD. MACH. SPACE

DWG. NO. 411640I

6

SYMBOL	
FW	FRESH WATER PIPE
PO	POTABLE WATER PIPE } PLAN ONLY
HW	HOT WATER PIPE
GS	STEAM SUPPLY PIPE } SECTION ONLY
GR	STEAM DRAIN PIPE
○	PIPE VERTICALLY UP
◉	PIPE VERTICALLY DOWN
⊙	PIPE VERTICALLY UP & DOWN (DK. PENETRATION)
	MIXING FAUCET FOR WASH BASIN
	SHOWER
	MIXING SWING FAUCET
	WATER CLOSET WITH FLUSH VALVE & VACUUM BREAKER
	WASH BASIN
D.F.	DRINKING FOUNTAIN
W.T.	WASH TUB
W.M.	WASH. MACHINE
	TEMPERATURE CONTROL & CAPILLARY TUBE
	AUTOMATIC START
	AUTOMATIC STOP
PS	PRESSURE SWITCH
P	PRESSURE GAUGE
T	THERMOMETER
C	COMPOUND GAUGE
	GLASS LEVEL GAUGE
S	VALVE ACTUATOR (SOLENOID TYPE)
	RELIEF VALVE
	TWO-WAY COCK
	DRAIN TRAP WITH STRAINER (STEAM TRAP)
	LIFT CHECK VALVE
	STRAINER
	REDUCER

三井造船株式会社 DWG. NO. 411640I

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 411640I

SYSTEM	NOM. SIZE mm	NOM. SIZE Inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
HOT FRESH AND POTABLE WATER LINE	10 15 20 25 40 50 65	3/8 1/2 3/4 1 1 1/2 2 2 1/2	15 20 25 30 45 55 70	1.4 1.8 1.8 2.0 2.0 2.3 2.5	SEAMLESS COPPER PIPE C1220T-1/2H JIS H 3300 (EQUIV. TO ASTM B88 -12200-H)	10K (143PSI)	SLIP-ON BRAZING COPPER FLG. BC7 JISH5111 OR SOCKET (EQUIV. TO ASTM B61 OR B88) ← IN GENERAL, FLANGE JOINT SHALL BE USED EXCEPT THE PIPINGS PASSING THROUGH OVERHEAD OF FOLLOWING SPACES BATT. RM, RADIO RM., MESS RM, PANTRY GALLEY, DINING RM., HANDLING SPACE DRY PROV. STORE AND SWITCH BOARD RM.	"SEE FITTING LIST"			10K (143PSI)	SEAMLESS COPPER PIPE JOINT (BRAZING)	70°C (158°F)	6.8 K (97PSI)
SHELL PIECE ATTACHED ON HULL	65 80 125	2 1/2 3 5	89.1 101.6 139.8	12.0 12.7 12.7	SEAMLESS STEEL PIPE STS 38-S JIS G 3455 UNGALV. (EQUIV. TO ASTM A106 GRADE A) SHELL PAINT		STEEL SLIP-ON WELD. FLG. SS41 JIS G 3101 (EQUIV. TO ASTM A36)	—	—	—		UNGALV.	38°C (100°F)	1K (14PSI)
COOLING SEA WATER ATTACHED ON SWIMMING POOL'S WALL	50	2	60.5	5.5	WELDED CARBON STEEL PIPE STPG-38E SCH.80 JIS G 3454 (EQUIV. TO ASTM A53 GrA) GALV.		DO.	—	—	—		GALV.	38°C (100°F)	7K (100PSI)
FRESH WATER (DRAIN LINE) FOR CALORIFIER STERILIZER AND HYDROHORE UNIT	15 20 25	1/2 3/4 1	21.7 27.2 34.0	2.8 2.9 3.4	DO. GALV.	10K (143PSI)	DO	"SEE FITTING LIST"				BRANCH FABRICATED BY WELD TO PIPE	38°C (100°F)	1K (14PSI)
FRESH WATER ATTACHED ON POTABLE WATER TANK	65	2 1/2	76.3	7.0	STAINLESS STEEL PIPE JIS G 3459 SUS 304 TP (EQUIV TO ASTM A312 Gr. TP 304)		STAINLESS STEEL SLIP-ON WELD FLANGE JIS G 3214 SUS F 304 (EQUIV TO ASTM A182 Gr. F304)	—	—	—		—	38°C (100°F)	6K (86PSI)

8

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 411640I

SYSTEM	NOM. SIZE mm	NOM. SIZE Inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
COOLING SEA WATER LINE	15 25 50 65 80 125	1/2 1 2 2 1/2 3 5	15.14 28.24 54.05 66.75 79.86 131.67	1.22 1.42 1.62 1.62 1.82 2.33	90-10 COPPER NICKEL PIPE 90-10 CU-NI C7060T JISH 3300 (EQUIVALENT TO ASTM B466 - C70600)	10K (143PSI)	CAST BRONZE BRAZING FLANGE BC7 JIS H 5111 (EQUIVALENT TO ASTM B61) 50 & BELOW; OUTER STEEL FLANGE & INNER ALUMI BRONZE BRAZING FLG. JIS G3101-SS41 & JIS H5114-ALBC2 (EQUIVALENT TO ASTM A36 & B148.954) INNER FLG. OUTER FLG. 65 & OVER	"SEE FITTING LIST"			10K (143PSI)	SEAMLESS CUPRO NICKEL PIPE JOINT OR BUTT WELD	38°C (100°F)	7 K (100PSI)
STEAM LINE IN GALLEY	15	1/2	21.7	3.7	SCH.80									
STEAM LINE (EXCEPT ABOVE MENTIONED)	15 20 25 32 40 50 65	1/2 3/4 1 1 1/4 1 1/2 2 2 1/2	21.7 27.2 34.0 42.7 48.6 60.5 76.3	2.8 2.9 3.4 3.6 3.7 3.9 5.2	WELDED CARBON STEEL PIPE STPG 38-E SCH.40 JIS G 3454 UNGALVANIZED (EQUIVALENT TO ASTM A53-GrA)	10K (143PSI)	STEEL SLIP-ON WELD. FLANGE WITHOUT HAB SS41 (JIS G3101) (EQUIVALENT TO ASTM A36) OR SLEEVE JOINT (EQUIV. TO ASTM A106 GrA)	"SEE FITTING LIST"			10K (143PSI)	BRANCH: FABRICATED BY WELDING PIPE TO PIPE UNGALV.	171°C (340°F)	7.2K (102PSI)

7

1670

FITTING LIST

SYMBOL	NAME	PRESS KG/cm²	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DAI MM	NOM. DAI INCH	QUANTITY	LIST NO.	REMARKS
	STOP GLOBE VALVE	16 (227PSI)	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)	STAINLESS STEEL SUS 304 JIS G4303	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62) OR STAINLESS STEEL SCS13 JIS G5121	15	1/2	25	HWV-101(1) GSV-101(1) POV-102 POV-101(15)	GRV-101(2) GSV-102(3) GSV-105(2)
						20	3/4	12	POV-201 FWV-201 HWV-201, 202 (3)	GRV-201 GSV-205(3)
						40	1 1/2	27	HWV-401(8) 402(10) POV-401(9)	SEE PAGE 14
						25	1	1	GSV-303	(墅 NO. 4216490, 4216529)
		10 (143PSI)	CAST STEEL SC46 OR 49 JIS G5101 (EQUIV. TO ASTM A216 GR. WCA OR WCB)	(EQUIV. TO ASTM A276 TYPE 304)	(EQUIV. TO ASTM A351 -CF8)				FWV-608(2)	SEE PAGE 15
						65	2 1/2	12	FWV-601~4(2) GSV-601, FWV-606	(墅 NO. 4216530, 4216491)
	FAUCET WITH HOSE COUPLING & VACUUM BREAKER	10 (143PSI)	CAST BRONZE BC6 JIS H5111 (ASTM B62) SEE PAGE 13			15	1/2	7	POV-104	SEE PAGE 13
										(墅 NO. 4216492)
	SCREW DOWN CHECK GLOBE VALVE	16 (227PSI)	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)	STAINLESS STEEL SUS 304 JIS G4303	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62) OR STAINLESS STEEL SCS13 JIS G5121	32	1 1/4	2	GRV-321(2)	SEE PAGE 16
						20	3/4	5	GSV-206(1) POV-202(4)	
						15	1/2	1	GSV-106(1)	
						20	3/4	4	POV-202	4216467
						40	1 1/2	1	POV-402	(墅 NO. 4216529, 4216490)
		10 (143PSI)	CAST STEEL SC 46 OR 49 JIS G 5101 (EQUIV. TO ASTM A216 GR. WCA OR WCB)	(EQUIV. TO ASTM A276 TYPE 304)	(EQUIV. TO ASTM A351 -CF8)	65	2 1/2	2	POV-602~3	SEE PAGE 17
										(墅 NO. 4216530, 4216491)
										SEE PAGE 12
	SPRAY NOZZLE	2 (28PSI)	SEE PAGE 12			10	3/8	15	POV-106	(墅 NO. 4216486)

FITTING LIST FOR COOL. SEA WATER

SYMBOL	NAME	PRESS KG/cm²	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DAI MM	NOM. DAI INCH	QUANTITY	LIST NO.	REMARKS
	PISTON TYPE (ON-OFF CONT.) REMOTE CONT. BUTTERFLY VALVE (CYLINDER VALVE)	10 (143PSI) OR	NOM. DAI: 50 & ABOVE CAST STEEL SC46 OR 49 JIS G5101 (EQUIV. TO ASTM A216 GRADE WCA OR WCB)	ALUMINIUM BRONZE ABB2 JIS H 3250 -C6191B (EQUIV. TO CDA 619)	NOM. DAI; 50 & ABOVE ALUMINIUM CAST BRONZE ALBC2 JIS H 5114 (EQUIV. TO ASTM B148 -C95400)	65	2 1/2	1	CWV-601	"SEE OTHER DRAWING" (DWG. NO. 4116406)
						80	3	1	CWV-701	
						125	5	2	CWV-901~2	(墅 NO. 4216406)
	BUTTERFLY VALVE					65	2 1/2	1	CWV-602	"SEE OTHER DRAWING" (DWG. NO. 4116405)
						80	3	4	CWV-702~5	
						125	5	5	CWV-903, 905(2), 906(2)	(墅 NO. 4216405)
	SCREW. DOWN CHECK GLOBE VALVE	16 (227PSI)	NOM. DAI.: 40 & BELOW CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)		NOM. DAI; 40 & BELOW CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62) OR STAINLESS ST SCS13 JIS G5121 (EQUIV. TO ASTM A351 -CF8)	15	1/2	2	CWV-102~3	SEE PAGE 16 (墅 NO. 4216490, 4216529)
						50	2	1	CWV-503	SEE PAGE 17
						125	5	1	CWV-909	(墅 NO. 4216491, 4216530)
	STOP GLOBE VALVE									SEE PAGE 14
						25	1	4	CWV-302.3 (EACH 2)	(墅 NO. 4216490)
						50	2	3	CWV-501~2 504	SEE PAGE 15 (墅 NO. 4216491, 4216430)
	SCREW DOWN CHECK ANGLE VALVE					50	2	1	CWV-505	"SEE OTHER DRAWING" (DWG. NO. 5233114)
						80	3	1	CWV-707	
						125	5	1	CWV-904	
										(墅 NO. 4216491, 4216530)

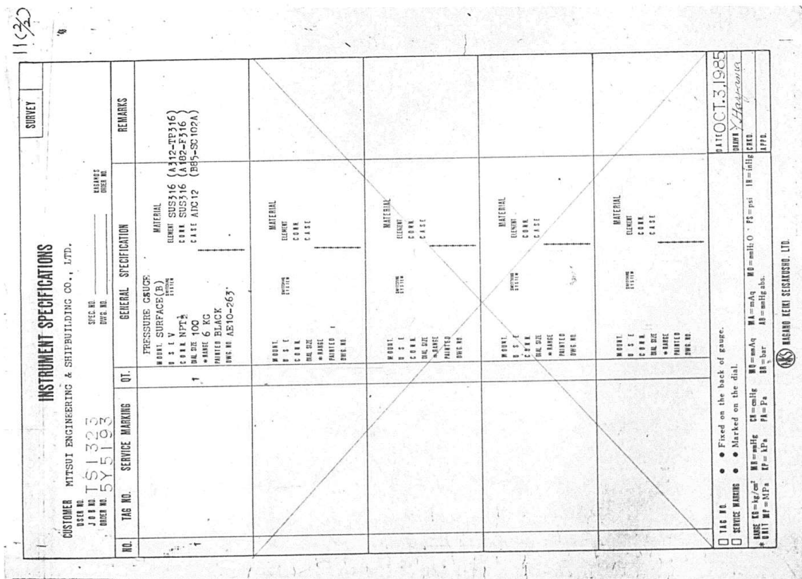
NOTE;
INSIDE OF COOLING SEA WATER VALVES EXCEPT BUTTERFLY VALVE AND VALVE 40A & BELOW ARE TO BE SHOT BLAST AND TAR EPOXY COATED.

FITTING LIST

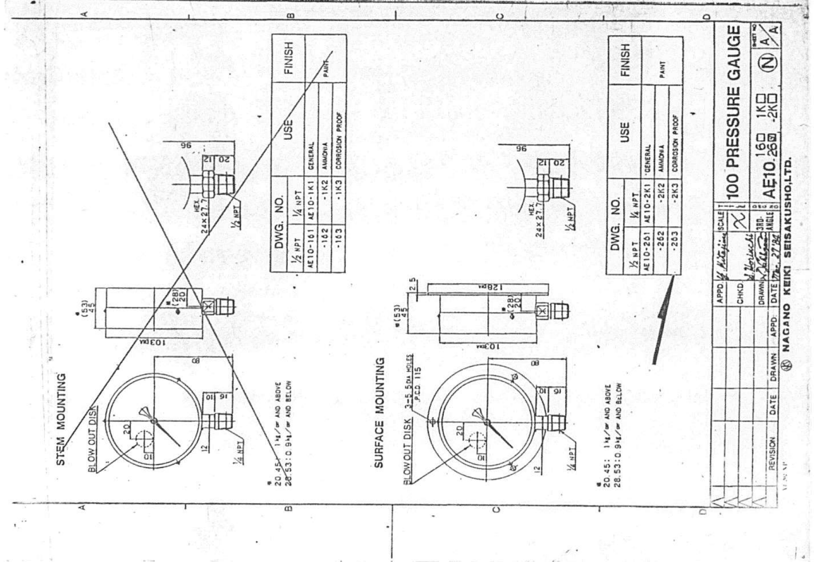
SYMBOL	NAME	PRESS KG/cm²	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DAI MM	NOM. DAI INCH	QUANTITY	LIST NO.	REMARKS
	DRAIN TRAP WITH STRAINER (STEAM TRAP)	10 (143PSI)	CAST STEEL SC 46 OR 49 JIS G 5101 (EQUIV. TO ASTM A216 GR WCA OR WCB)	STRAINER SS41 JIS G 3101 OR SUS 304 JIS G 4303 (EQUIV. TO ASTM A36 OR A240 TYPE 304)		15	1/2	2	GRV-102(2)	"SEE OTHER DRAWING" (DWG. NO. 5233212)
						15	1/2	1	GSV-107	
						20	3/4	1	GSV-207	(墅 NO. 4216433)
	STOP ANGLE VALVE	16 (227PSI)	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)			15	1/2	2	GSV-103(2)	"SEE OTHER DRAWING" (DWG. NO. 5233114)
										(墅 NO. 4216529, 4216490)
	PRESSURE REDUCING VALVE		CAST STEEL SC 46 OR 49 JIS G5101	STAINLESS STEEL SUS 304 JIS G4303	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62) OR STAINLESS STEEL SCS13 JIS G5121	25	1	1	GSV-301	"SEE OTHER DRAWING" (DWG NO. 4116418)
						50	2	1	GSV-501	
	RELIEF VALVE	10 (143PSI)	(EQUIV. TO ASTM A216 GRADE WCA OR WCB)	(EQUIV. TO ASTM A276 TYPE 304)	(EQUIV. TO ASTM A351 -CF8)	25	1	1	GSV-302	
						50	2	1	GSV-502	(墅 NO. 4216418)
	PRESSURE GAUGE AND VALVE (FLARE TYPE)		SUS 316 JIS G 4307 (EQUIV. TO ASTM A312 TP316)			—	—	1	GSV-1	SEE PAGE 11-(2/2) (墅 NO. 4216429)
			CAST BRONZE BC6 JIS H5111 (ASTM B62)	STAINLESS ST. SUS 304 JIS G 4303 (ASTM A276 TYPE 304)		—	—	1	GSV-2	"SEE OTHER DRAWING" (DWG NO. 5233114) (墅 NO. 4216432)
	SINGLE WATER STRAINER	1 (14 PSI)	CAST STEEL SC46 OR 49 JIS G 5101 (EQUIV. TO ASTM A216 GRADE WCA)	STRAINER SS41 JIS G 3101 OR SUS 304 JIS G 4303 (EQUIV. TO ASTM A36 OR A240 TYPE 304)						SEE PAGE 18
						65	2 1/2	3	FWV-605(2) CWV-603	
						80	3	1	CWV-706	(墅 NO. 4216404)
						125	5	1	CWV-907	SEE PAGE 19 (墅 NO. 4216404)

三井造船株式会社 DWG. No. 41640

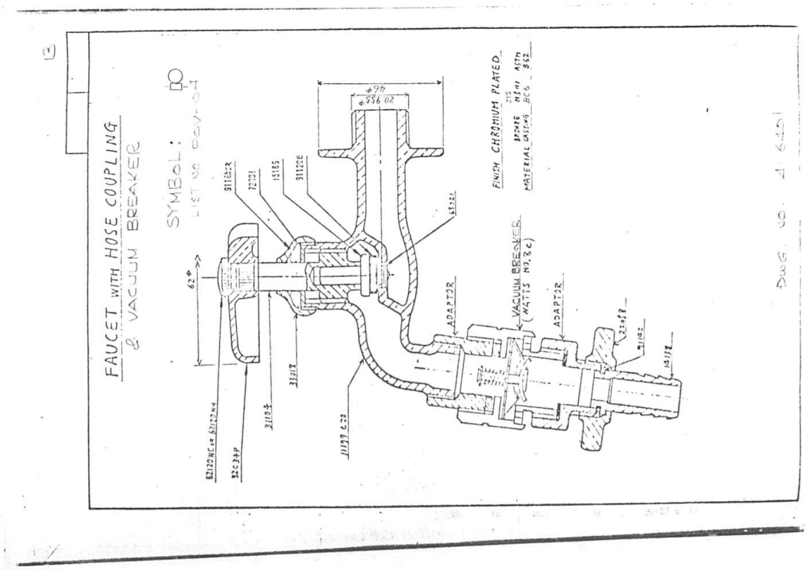
11(2/2)



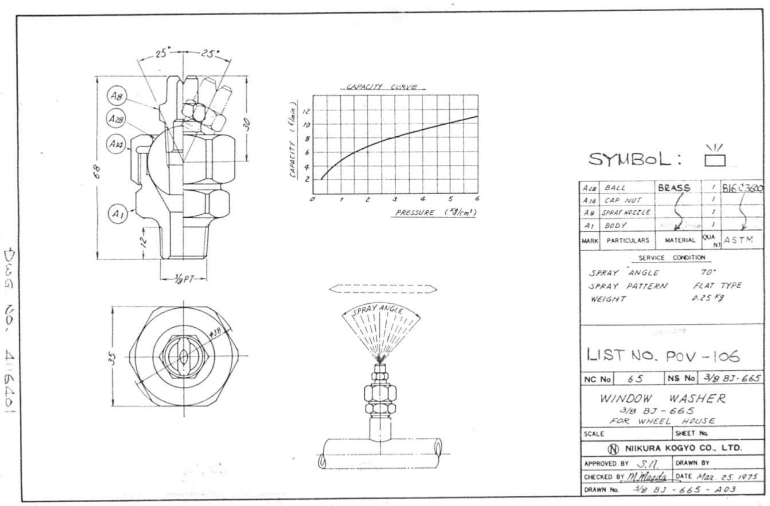
INSTRUMENT SPECIFICATIONS
MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
SURVEY
PRESSURE GAUGE
NAGANO KEIKI SEISAKUSHO, LTD.



STEM MOUNTING
SURFACE MOUNTING
DWG. NO.
USE
FINISH
GENERAL
AMMONIA
CORROSION PROOF
100 PRESSURE GAUGE
NAGANO KEIKI SEISAKUSHO, LTD.



FAUCET WITH HOSE COUPLING & VACUUM BREAKER
SYMBOL:
VACUUM BREAKER
ADAPTOR
FINISH CHROMIUM PLATED



CAPACITY CURVE
PRESSURE
SYMBOL:
BALL
CAP NUT
SPRAY NOZZLE
BODY
BRASS
ASTM
SERVICE CONDITION
SPRAY ANGLE 70°
SPRAY PATTERN FLAT TYPE
LIST NO. POV-106
WINDOW WASHER
3/8 BJ-665
FOR WHEEL HOUSE
NIIKURA KOGYO CO., LTD.

1672

DWG. NO. 41640

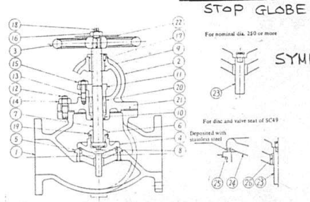
CAST STEEL 10kg/cm² STOP GLOBE VALVE

SYMBOL: ⋈

For nominal dia. 250 or more

For disc and valve seat of SC49

Deposited with stainless steel

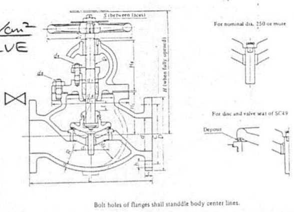


MATERIAL FOR COOL. SEA WATER VALVE

No.	Component	Material	No.	Component	Material
1	Body	JIS G 5101 - SC49 (ASTM A216 GRADE WCA)	14	Hexagon nut	JIS G 3101 - SS41 (ASTM A307 Gr B)
2	Bonnet	JIS G 5101 - SC49 (ASTM A216 GRADE WCA)	15	Hexagon nut	JIS H 3250 - C3771BD (ASTM B124 C37700)
3	Handwheel	JIS G 5501 - FC20 (ASTM A126 GRADE A)	16	Hexagon nut	JIS H 3250 - C3771BD (ASTM B124 C37700)
4	Disc	JIS G 5121 - ~~SCS2~~ SCS13 (ASTM A351-CF8) — JIS H5114 ALBC2 (ASTM B-148 - C95400)	17	Lock pin	JIS G 3101 - SS41 (ASTM A307 Gr B)
5	Valve seat	JIS G 5121 - ~~SCS2~~ SCS13 (ASTM A351-CF8) — JIS H5114 ALBC2 (ASTM B-148 - C95400)	18	Split pin	JIS H 3260 - C2600W
6	Packing bush	JIS G 4303 - SUS420J1 (ASTM A182 TYPE 420)	19	Disc lock washer	JIS G 4303 - SUS304 (ASTM A276 TYPE 304)
7	Stem	JIS G 4303 - SUS403 304 (ASTM A TYPE 304) — JIS H 3250 ABB2 ASTM B-150 (CDA 619)	20	Packing	~~JIS F 7102~~ NON ASBESTOS
8	Washer for stem	JIS G 4404 - SKD1	21	*Gasket	~~JIS F 7102~~ NON ASBESTOS
9	Screwed bonnet bush	JIS H 3250 - C6782BD (ASTM B584 C86400)	22	Name plate	JIS H 3100 - C2801P
10	Packing bush	JIS G 4303 - SUS420J1 (ASTM A182 TYPE 420)	23	Disc guide	JIS G 4303 - SUS~~403~~ 304 (ASTM A276 TYPE 304)
11	Packing gland	JIS H 5111 - BC6 (ASTM B62)	24	Disc	JIS G 5101 - SC49 (ASTM A216 GRADE A)
12	Stud	JIS G 3101 - SS50 (ASTM A307 Gr B)	25	Valve seat	JIS G 5101 - SC49 (ASTM A216 GRADE A)
13	Stud	JIS G 3101 - SS41 (ASTM A307 Gr B)	26	Bush	JIS G 4303 - SUS420J1 (ASTM A276 TYPE 420)

Remarks:
1. Letters in boldface show the materials specified in 4. (1).
2. The contact surfaces of stainless steel shall be provided with different hardness by heat treatment or else so as to prevent seizure.
3. The material for depositing to the disc and valve seat shall have performance equivalent or better than that of the material of Part No.5. For valves intended for use with sea water, the material for depositing shall be austenite stainless steel.

Fig. 2



For nominal dia. 250 or more

For disc and valve seat of SC49

Deposit

Bolt holes of flanges shall standdle body center lines.

Unit: mm

Nominal dia.	d	d_1	L	D (Flange)	P.C. dia. C	No.	h	Nominal dia. of bolt	t	H (when fully opened)	l (Lift)	D_2 (Handwheel)	d_2	a	R	H_1	D_1	d_3	H_2 (Height of bonnet)	d_4 (Stem threads)	S	d_7 (Stuffing box)	d_8 (Threads)	d_9 (Threads)	Calculated mass (kg)
50	50	58	220	155	120	4	19	M16	16	270	17	160	110	8	110	90	155	78	120	TW22	14	36	M16	M12	17.9
65	65	73	270	175	140	4	19	M16	18	300	22	200	135	9	135	100	175	95	128	TW24	17	38	M16	M12	26.0
80	80	88	300	185	150	8	19	M16	18	310	27	200	160	9	160	105	190	110	128	TW24	17	38	M16	M12	29.8
100	100	111	350	210	175	8	19	M16	18	355	33	250	195	11	195	125	215	135	142	TW28	22	44	M16	M12	44.7
125	125	138	420	250	210	8	23	M20	20	415	42	280	240	12	240	150	260	165	165	TW32	22	50	M20	M16	70.3
150	150	163	490	280	240	8	23	M20	22	470	50	315	280	13	280	170	285	190	185	TW36	27	56	M20	M16	96.4
200	200	213	570	330	290	12	23	M20	22	565	67	355	365	15	365	210	335	240	218	TW42	30	66	M20	M16	159
250	250	265	740	400	355	12	25	M22	24	645	83	400	470	16	470	259	405	300	225	TW44	32	68	M22	M20	257
300	300	315	840	445	400	16	25	M22	24	735	100	450	550	17	550	300	460	355	249	TW48	36	74	M22	M20	370

Remarks:
1. The flanges shall conform to JIS B 2212.
2. The threads d_4 shall conform to JIS B 0222 and d_8 and d_9 to JIS B 0205.
3. The name plate shall be specified by purchaser as required.

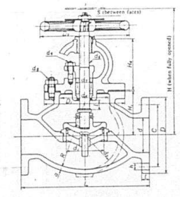
Fig. 1

DWG. NO. 41640

15

CAST STEEL 10kg/cm² SCREW DOWN CHECK GLOBE VALVE

SYMBOL:



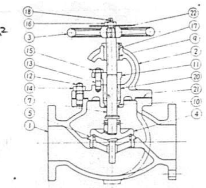
Bolt holes of flanges shall straddle body centre lines.

Unit: mm

Nominal dia.	d	d_1	L	D (Flange)	P.C. dia. C	No.	h	Nominal dia. of bolt	t	H (when fully opened)	l (Lift)	D_2 (Handwheel)	d_2	a	R	H_1	D_1	d_3	H_2 (Ht. of bonnet)	d_4 (Stem threads)	S	d_7 (Stuffing box)	d_8 (Threads)	d_9 (Threads)	Calculated mass (kg)
50	50	58	220	155	120	4	19	M16	16	265	15	160	110	8	110	90	155	78	120	TW22	14	36	M16	M12	17.9
65	65	73	270	175	140	4	19	M16	18	295	17	200	135	9	135	100	175	95	128	TW24	17	38	M16	M12	26.1
80	80	88	300	185	150	8	19	M16	18	300	20	200	160	9	160	105	190	110	128	TW24	17	38	M16	M12	29.8
100	100	111	350	210	175	8	19	M16	18	345	25	250	195	11	195	125	215	135	142	TW28	22	44	M16	M12	44.8
125	125	138	420	250	210	8	23	M20	20	405	31	280	240	12	240	150	260	165	165	TW32	22	50	M20	M16	69.8
150	150	163	490	280	240	8	23	M20	22	455	37	315	280	13	280	170	285	190	185	TW36	27	56	M20	M16	96.3
200	200	213	570	330	290	12	23	M20	22	545	46	355	365	15	365	210	335	240	218	TW42	30	56	M20	M16	158

Remarks:
1. The flanges shall conform to JIS B 2212.
2. The threads d_4 shall conform to JIS B 0222 and d_8 and d_9 to JIS B 0205.
3. The name plate shall be specified by purchaser as required.

Fig. 1 Stem-Guide Type



MATERIAL FOR COOL SEA WATER VALVE

No.	Component	Material	No.	Component	Material
1	Body	JIS G 5101 - SC 49 (ASTM A216 GRADE WCA)	13	Stud	JIS G 3101 - SS 41 ~~JIS H 3250 - C 3771 BD~~ (ASTM A307 Gr B)
2	Bonnet	JIS G 5101 - SC 49 (ASTM A216 GRADE WCA)	14	Hexagon nut	JIS G 3101 - SS 41 ~~JIS H 3250 - C 3771 BD~~ (ASTM A307 Gr B)
3	Handwheel	JIS G 5501 - FC 20 (ASTM A126 GRADE A)	15	Hexagon nut	JIS G 3101 - SS 41 ~~JIS H 3250 - C 3771 BD~~ (ASTM A307 Gr B)
4	Disc	JIS G 5121 - ~~SCS2~~ SCS13 (ASTM A351-CF8) — JIS H5114 ALBC2 (ASTM B148-95400)	16	Hexagon nut	JIS H 3250 - C 3771 BD (ASTM B124 ...)
5	Valve seat	JIS G 5121 - ~~SCS2~~ SCS13 (ASTM A351-CF8) — JIS H5114 ALBC2 (ASTM B148-95400)	17	Lock pin	JIS G 3101 - SS 41 (ASTM A307 Gr B)
7	Stem	JIS G 4303 - SUS ~~403~~ 304 (ASTM A276 TYPE 304) — JIS H3250 ABB2 (CDA 619)	18	Split pin	JIS H 3260 - C 2600 W
9	Screw bonnet bush	JIS H 3250 - C 6782 BD (ASTM B584 C86400)	20	Packing	~~JIS F 7102~~ (NON ASBESTOS)
10	Seat ring	JIS G 4303 - SUS 420 J1 (ASTM A276 - 420)	21	Gasket	~~JIS F 7102~~ (NON ASBESTOS)
11	Packing gland	JIS H 5111 - BC 6 (ASTM B62)	22	Name plate	JIS H 3100 - C 2801 P-H
12	Stud	JIS G 3101 - SS 50 (ASTM A307 Gr B)			

Remarks:
1. Letters in boldface show the materials specified in 5. (1).
2. Materials in parentheses may be used when specified by purchaser.
3. The contact surfaces of stainless steel shall be provided with appropriate difference in hardness by heat treatment or else so as to prevent seizure.

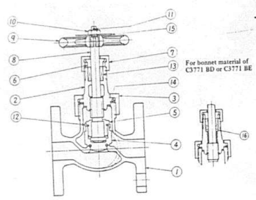
Fig. 2 Stem-Guide Type

17

F 7344-1982

BRONZE 16kg/cm² STOP GLOBE VALVE

SYMBOL: ⋈



For bonnet material of C3771 BD or C3771 BE

DWG. NO. 41640

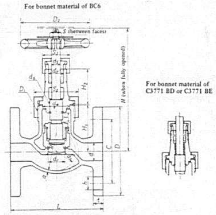
MATERIAL FOR COOLING SEA W

No.	Component	Material
1	Body	JIS H 5111 - BC6 (ASTM-B62)
2	Bonnet	~~JIS H 3250 - C 3771 BD or C 3771 BE or~~ JIS H 5111 - BC 6 (ASTM-B62)
3	Bonnet nut	~~JIS H 3250 - C 3771 BD or C 3771 BE or~~ JIS H 5111 - BC 6 (ASTM-B62)
4	Disc	~~JIS H 3250 - C 3771 BD or C 3771 BE or~~ JIS H 5111 - BC 6 (ASTM-B62)
5	Disc nut	~~JIS H 3250 - C 3771 BD or~~ JIS H 5111 - BC 6 (ASTM-B62)
6	Packing gland	~~JIS H 3250 - C 3771 BD or~~ JIS H 5111 - BC 6 (ASTM-B62)
7	Gland nut	~~JIS H 3250 - C 3771 BD or~~ JIS H 5111 - BC 6 (ASTM-B62)
8	Stem	JIS G 4303 - ~~JIS H 3250 - C 3771 BD or JIS H 5111 - BC6~~ (ASTM A276 TYPE 304) — JIS H3250-ABB2 (CDA 619)
9	Handwheel	JIS G 5501 - FC 20 (ASTM A126 GRDE A)
10	Hexagon nut	JIS H 3250 - C 3771 BD (ASTM B124 C37700)
11	Split pin	JIS H 3260 - C 2600 W
12	Disc lock washer	~~JIS H 3100 - C 2600 P~~ JIS G4303 SUS303P (ASTM A240 TYPE 304)
13	Packing	~~JIS F 7102~~ NON ASBESTOS
14	Gasket	~~JIS F 7102~~ NON ASBESTOS
15	Name plate	JIS H 3100 - C 2801 P
16	Seat ring	JIS H 3250 - C 3771 BD or C 3771 BE

Remark: Letters in boldface show the materials specified in 4. (1).

Fig. 2

For bonnet material of BC6



For bonnet material of C3771 BD or C3771 BE

Bolt holes of flanges shall straddle body center lines.

Unit: mm

Nominal dia.	d	d_1	L	D (Flange)	P.C. dia. C	No.	h	Nominal of bolt dia.	t	H (when fully opened)	l (Lift)	D_2 (Handwheel)	d_2	a	R	H_1	D_1 (Threads)	d_4	H_2 (Ht. of bonnet)	d_5	d_6 (Stem threads)	S	d_7 (Stuffing box)	S_1 (Between faces)	S_2 (Between faces)	Reference: Calculated mass (kg)
15	15	15	110	95	70	4	15	M12	12	155	10	80	37	4	37	55	M45×2	32	43	10	TW14	8	17	55	32	2.96
20	20	20	120	100	75	4	15	M12	14	165	12	100	45	4	45	60	M48×2	35	47	12	TW16	10	19	55	36	3.92
25	25	25	130	125	90	4	19	M16	14	185	14	125	52	4	52	68	M52×2	38	54	13	TW18	10	21	60	36	5.63
32	32	32	160	135	100	4	19	M16	16	195	17	125	65	5	65	70	M60×2	42	56	13	TW18	10	21	70	36	7.24
40	40	40	180	140	105	4	19	M16	16	210	20	140	80	6	80	78	M68×2	50	59	15	TW20	12	23	80	41	9.12

Remarks:
1. The flanges shall conform to nominal pressure 16 kgf/cm² of JIS B 2240.
2. The threads d_6 shall conform to JIS B 0222, and D_1 to JIS B 0207.
3. The name plate shall be specified by purchaser as required.

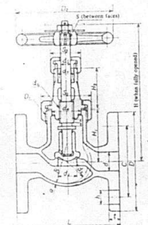
Fig. 1

14

F 7413-1982

BRONZE 16kg/cm² SCREW DOWN CHECK GLOBE VALVE

SYMBOL:



Bolt holes of flanges shall straddle body center lines.

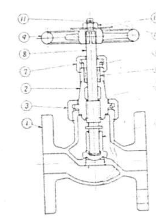
DWG. NO. 41640

Unit: mm

Nominal dia.	d	d_1	L	D (Flange)	P.C. dia. C	No.	h	Nominal dia. of bolt	t	H (when fully opened)	l (Lift)	D_2 (Handwheel)	d_2	a	R	H_1	D_1 (Threads)	d_4	H_2 (Ht. of bonnet)	d_5	d_6 (Stem threads)	S	d_7 (Stuffing box)	S_1 (Between faces)	S_2 (Between faces)	Reference: Calculated mass (kg)
15	15	15	110	[illegible]	[illegible]	4	15	M12	12	150	5	80	37	4	37	55	M45×2	32	43	10	TW14	8	17	55	32	2.87
20	20	20	120	100	75	4	15	M12	14	160	7	100	45	4	45	60	M48×2	35	47	12	TW16	10	19	55	36	3.79
25	25	25	130	125	90	4	19	M16	14	[illegible]	9	125	52	4	52	68	M52×2	38	54	13	TW18	10	21	60	36	5.44
32	32	32	160	135	100	4	19	M16	16	190	11	125	65	5	65	70	M60×2	42	56	13	TW18	10	21	70	36	7.04
40	40	40	180	140	105	4	19	M16	16	205	13	140	80	6	80	78	M68×2	50	59	15	TW20	12	23	80	41	8.89

Remarks:
1. The flanges shall conform to JIS B 2240.
2. The threads d_6 shall conform to JIS B 0222, and D_1 to JIS B 0207.
3. The name plate shall be specified by purchaser as required.

Fig. 1



MATERIAL FOR COOL SEA W

No.	Component	Material
1	Body	JIS H 5111 - BC 6 (ASTM-B62)
2	Bonnet	JIS H 5111 - BC 6 or ~~JIS H 3250 - C 3771 BD or C 3771 BE~~ (ASTM-B62)
3	Bonnet nut	JIS H 5111 - BC 6 or ~~JIS H 3250 - C 3771 BD or C 3771 BE~~ (ASTM-B62)
4	Disc	
6	Packing gland	JIS H 5111 - BC 6 or ~~JIS H 3250 - C 3771 BD~~ (ASTM-B62)
7	Gland nut	JIS H 5111 - BC 6 or ~~JIS H 3250 - C 3771 BD~~ (ASTM-B62)
8	Stem	~~JIS H 3250 - C 3771 BD or C 3771 BE~~ JIS G4303 SUS304 (ASTM A276 TYPE 304) — JIS H 3250 ABB2 (CDA 619)
9	Handwheel	JIS G 5501 - FC 20 (ASTM-A126 GRADE A)
10	Hexagon nut	JIS H 3250 - C 3771 BD (ASTM B124 C37700)
11	Split pin	JIS H 3260 - C 2600 W
13	Packing	~~JIS F 7102~~ NON ASBESTOS
14	Gasket	~~JIS F 7102~~ NON ASBESTOS
15	Name plate	JIS H 3100 - C 2801P

Remark: Letters in boldface show the materials specified in 4. (1).

Fig. 2

16

1673

SINGLE WATER STRAINER
(JIS F7121)

SYMBOL :

Nominal dia. 125 ~ 400

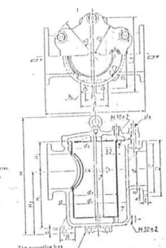
Nominal dia.	d	L	L_1	L_2	Flange D	Bolt hole P.C dia C	Bolt hole No.	Bolt hole h	Threads	t	Total height H (abt)	Body a	D_1	d_1	H_1	H_2	H_3	Cover D_2	Strainer cylinder d_2	Strainer cylinder d_3	Strainer cylinder H_4	Hinge bolt No.	Hinge bolt Threads
→ 125	125	400	200	30	250	210	8	19	M16	20	485	12	260	215	207	123	235	323	165	195	295	6	M20
150	150	460	230	35	265	230	8	19	M16	22	575	13	310	260	258	145	290	384	200	235	360	6	M22
200	200	550	275	50	320	280	8	23	M20	24	665	15	375	320	320	170	350	460	250	285	440	6	M24
250	250	680	340	60	385	345	12	23	M20	26	825	17	480	420	442	210	450	565	330	370	565	8	M24
300	300	760	380	70	430	390	12	23	M20	28	920	18	545	480	473	235	515	650	380	420	645	8	M30
350	335	820	410	75	480	435	12	25	M22	30	1030	19	605	535	529	265	575	710	420	465	780	8	M30
400	380	880	[illegible]	80	540	495	16	25	M22	30	1135	20	665	595	595	300	645	770	470	515	830	8	M30

Nominal dia.	Mounting legs A	B	l_1	F	F_1	t_1	Bolt hole h_1	Reference calculated mass Includ. strainer cylinder	Strainer cylinder	LIST NO
→ 125	120	65	300	260	80	18	19	62.2	3.37	CWV-907
150	130	70	350	310	90	20	19	88.6	4.31	
200	150	85	430	380	100	22	23	141	6.98	
250	200	100	540	480	140	24	25	246	12.8	
300	220	105	600	540	160	24	25	321	15.6	
350	240	105	650	590	180	26	25	418	20.3	
400	250	110	710	650	200	26	25	518	25.1	

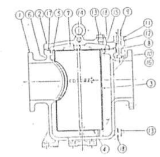
Remarks:
The dimensions of flanges shall conform to JIS B 2211.
The thread of d4 shall conform to JIS B 0205.
The thread of the plug shall conform to JIS B 0207.
The diameter and pitch of strainer cylinder holes shall be 8 mm and 11 mm.
The area ratio of strainer cylinder holes shall be approx. 4 ~ 4.5 times the nominal diameter.
The bolts of A part may be used stud bolts instead of hinge bolts for manufacture reason.

DWG. NO. 41640

Fig. 3



Bolt holes of flanges shall straddle body center lines.



No.	Component	Material JIS	ASTM
1	Body	JIS G 5101 - SC 46 OR 49	A216 GRADE WCA
2	Cover		
3	Strainer cylinder	JIS G 3101 - SS 41 OR JIS G 4303 - SUS 304	A36 OR A240 TYPE 304
4	Bottom plate		
5	Sword of strainer cylinder		
6	Liner		
7	Handle of strainer	JIS G 4801 - SUP 3	
8	Hinge bolt	JIS H 3250 - C 3771 BD	B124 C37700
9	Stopper ring		
10	Pin	JIS H 3250 - C 3771 BD	B124 C37700
11	Hexagon nut	JIS H 3250 - C 3771 BD	B124 C37700
12	Washer	JIS G 3101 - SS 41	A36
13	Plug	JIS H 3250 - C 3771 BD or JIS H 5111 - BC 6	B124 OR B62
14	Eye bolt	JIS G 4051 - S 20 C	A107
15	Set screw	JIS G 4303 - SUS 420 J 1	A276 TYPE 420
16	Split pin	JIS H 3260 - C 2600 W	
17	Gasket	~~JIS F 7101~~ NON ASBESTOS	
18			

Remarks:
1. Letters in boldface shall be shown the materials specified in 5. (1).
2. The strainer cylinder of No. 3 - 7 shall be galvanized after fabricating by weld.
3. The washer of No. 12 shall be galvanized.

Fig. 4

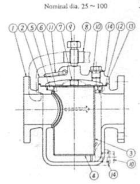
19

F 7121 1980

SINGLE WATER STRAINER
(JIS F7121)

SYMBOL :

Nominal dia. 25 ~ 100



No.	Component	Material
1	Body	JIS G 5101 - SC 46 OR 49 (ASTM A216 GRADE WCA)
2	Cover	
3	Strainer cylinder	JIS G 3101 - SS 41 OR JIS G 4303 - SUS 304 (ASTM A36) OR (ASTM A240 TYPE 304)
4	Bottom plate	
5	Sword of strainer cylinder	
6	Liner	
7	Handle of strainer	JIS G 4801 - SUP 3
8	Cover pusher	JIS G 4051 - S 25 C, JIS G 3101 - SS 41 or JIS G 5502 - FCD 40
9	Pushing bolt	JIS H 3250 - C 3771 BD
10	Plug	JIS H 3250 - C 3771 BD or JIS H 5111 - BC 6 (ASTM B124 OR B62)
11	Handle of cover	JIS G 3101 - SS 41
12	Set screw	JIS G 4303 - SUS 420 J 1
13	Gasket	NON ASBESTOS
14		

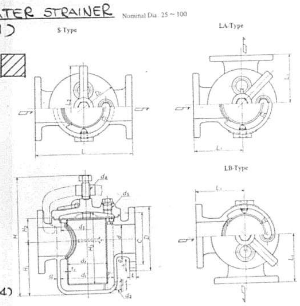
Remarks:
1. Letters in boldface shall be shown the materials specified in 5. (1).
2. The strainer cylinder of No. 3~7 shall be galvanized after fabricating by weld.

Fig. 2

DWG. NO. 41640

F 7121 1980

Nominal Dia. 25 ~ 100



Bolt holes of flanges shall straddle body center lines.

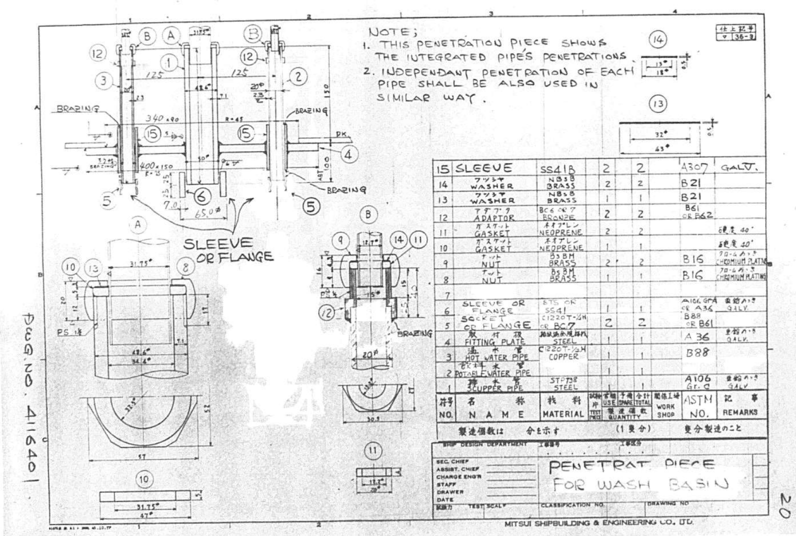
Unit: mm

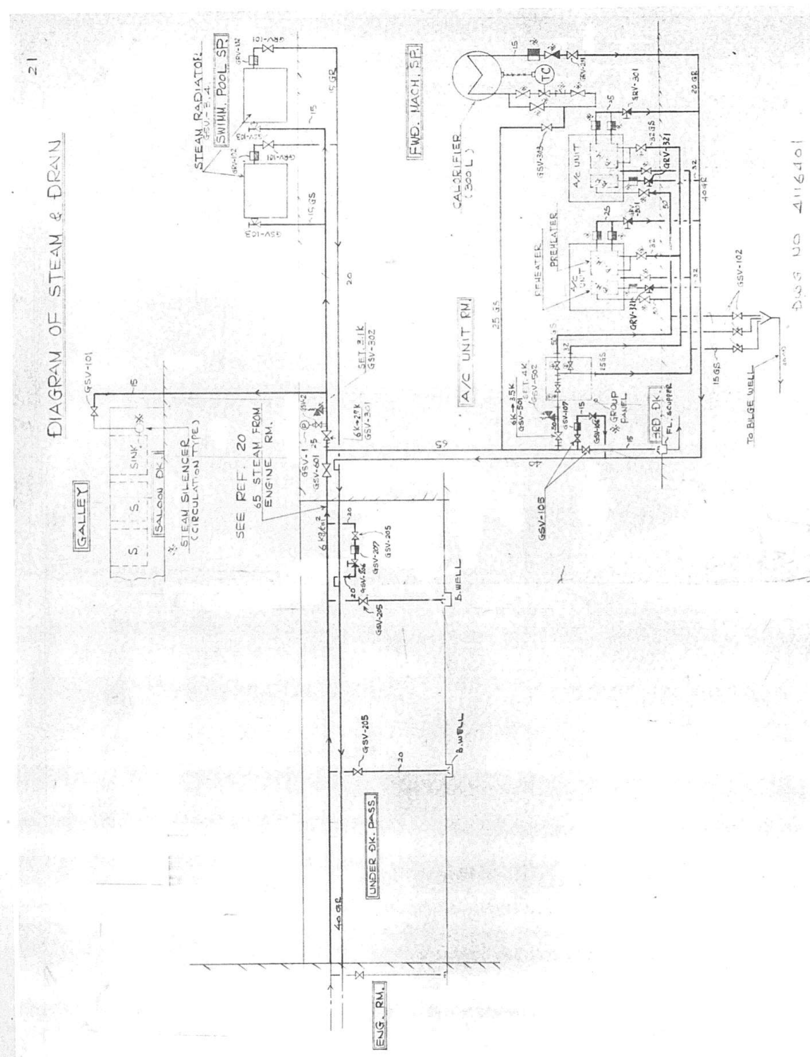
Nominal dia.	d	L	L_1	Flange D	Bolt hole P.C dia C	Bolt hole No.	Bolt hole h	Threads	t	Total height H (abt)	Body a	D_1	d_1	H_1	H_2	Strainer cylinder d_2	d_3	H_3	t_1	Pushing bolt Threads d_4	L_2	Plug Threads d_5	Reference calculated mass kg Includ. strainer cylinder	Strainer cylinder	LIST NO
25	25	170	85	95	75	4	12	M10	14	180	7	110	70	75	34.5	50	68	100	2.3	M16	138	M20 × 1.5	5.80	0.35	
40	40	190	95	120	95	4	15	M12	16	215	7	125	85	85	42	65	84	119	3.2	M20	155	M20 × 1.5	8.43	0.47	
50	50	200	100	130	105	4	15	M12	16	240	8	135	95	100	49	75	94	140	3.2	M20	170	M20 × 1.5	10.3	0.62	
→ 65	65	250	125	155	130	4	15	M12	18	305	9	170	130	135	59	100	125	184	3.2	M22	215	M22 × 2	18.5	1.21	FWV-605, CWV-603
→ 80	80	270	135	180	145	4	19	M16	18	340	9	190	145	152	68	110	140	209	3.2	M22	238	M24 × 2	24.0	1.52	CWV-706
100	100	320	160	200	165	8	19	M16	20	400	10	215	175	185	80	130	160	251	3.2	M30	275	M24 × 2	35.7	1.96	

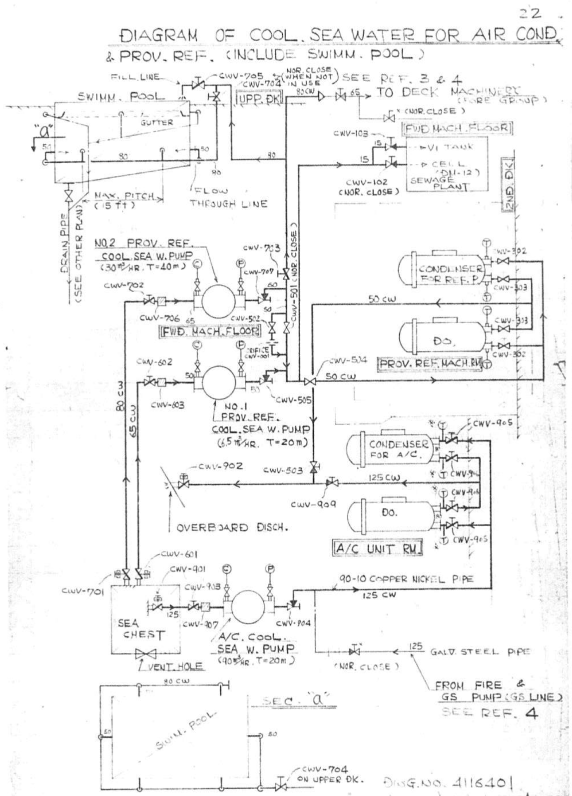
Remarks:
1. The flanges shall conform to JIS B 2211.
2. The thread d4 shall conform to JIS B 0205.
3. The thread d5 shall conform to JIS B 0207.
4. The diameter and pitch of strainer cylinder holes shall be 8 mm and 11 mm.
5. The area ratio of strainer cylinder holes shall be approx. 4 ~ 4.5 times the nominal diameter.

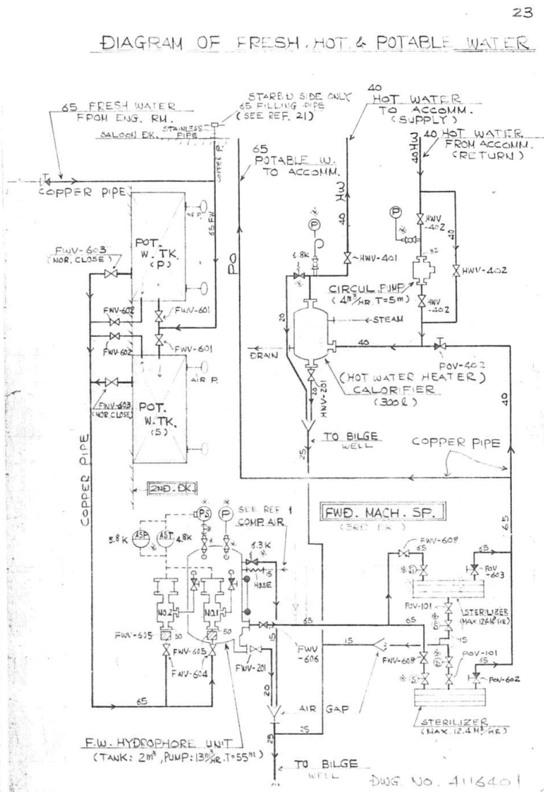
Fig. 1

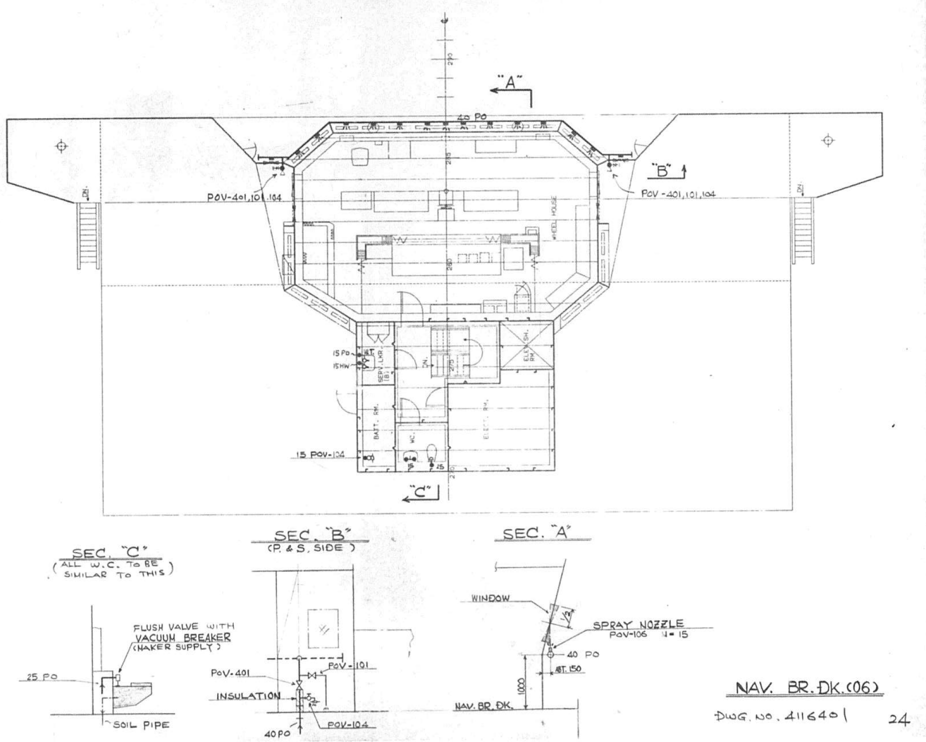
18


NOTE;
1. THIS PENETRATION PIECE SHOWS THE INTEGRATED PIPE'S PENETRATIONS.
2. INDEPENDANT PENETRATION OF EACH PIPE SHALL BE ALSO USED IN SIMILAR WAY.
SLEEVE OR FLANGE
BRAZING
PENETRAT PIECE FOR WASH BASIN
MITSUI SHIPBUILDING & ENGINEERING CO. LTD.
DWG. NO. 411640
20

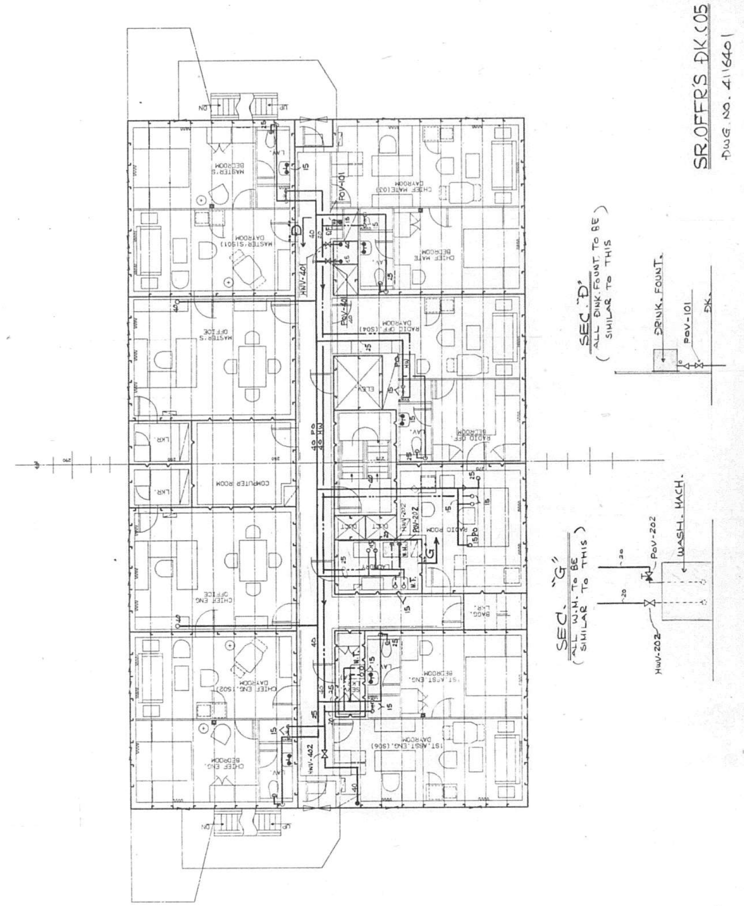

21
DIAGRAM OF STEAM & DRAIN
DWG NO 411640
GALLEY
SALOON DK.
STEAM SILENCER (CIRCULATION TYPE)
SEE REF. 20
65 STEAM FROM ENGINE RM.
STEAM RADIATOR
SWIMM. POOL SP.
FWD. MACH. SP.
CALORIFIER (300 L)
A/C UNIT RM.
TO BILGE WELL
UNDER DK. PASS
ENG. RM.


22
DIAGRAM OF COOL. SEA WATER FOR AIR COND. & PROV. REF. (INCLUDE SWIMM. POOL)
SWIMM. POOL
FILL LINE
SEE REF. 3 & 4
TO DECK MACHINERY
FWD. MACH. FLOOR
SEWAGE PLANT
2ND DK
FLOW THROUGH LINE
NO.2 PROV. REF. COOL. SEA W. PUMP
CONDENSER FOR REF. P.
PROV. REF. MACH. RM
NO.1 PROV. REF. COOL. SEA W. PUMP
CONDENSER FOR A/C
A/C UNIT RM
OVERBOARD DISCH.
SEA CHEST
VENT HOLE
A/C. COOL. SEA W. PUMP
90-10 COPPER NICKEL PIPE
GALV. STEEL PIPE
FROM FIRE & GS PUMP (GS LINE)
SEE REF. 4
SEC. "a"
DWG. NO. 411640|

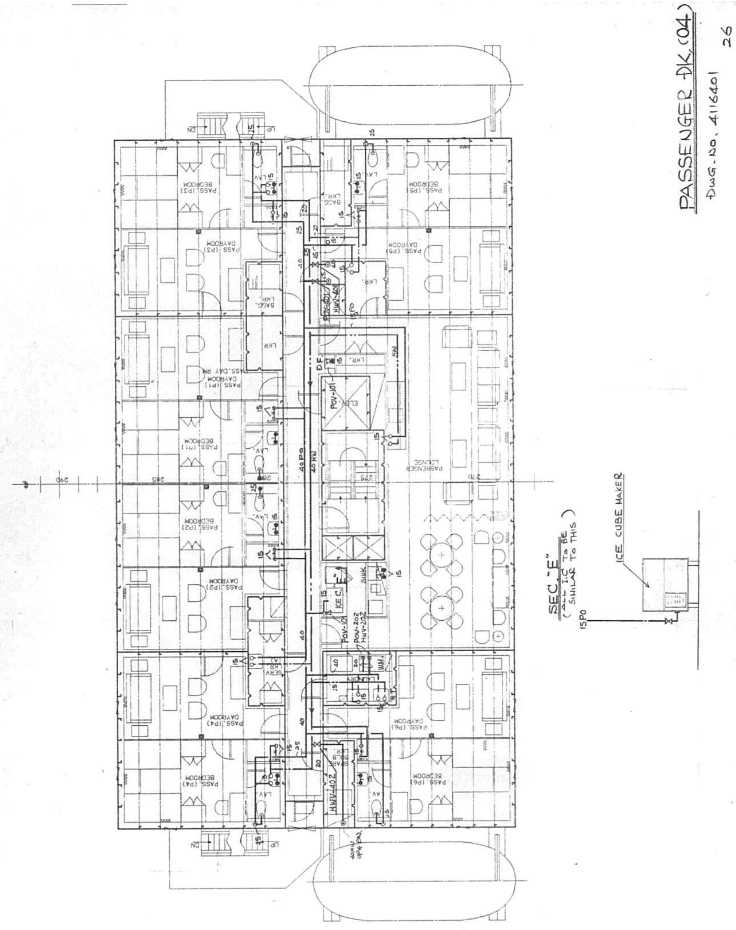

23
DIAGRAM OF FRESH, HOT & POTABLE WATER
65 FRESH WATER FROM ENG. RM.
COPPER PIPE
HOT WATER TO ACCOMM. (SUPPLY)
HOT WATER FROM ACCOMM. (RETURN)
POTABLE W. TO ACCOMM.
POT. W. TK. (P)
POT. W. TK. (S)
CIRCUL. PUMP
(HOT WATER HEATER) CALORIFIER (300ℓ)
TO BILGE WELL
2ND DK
FWD. MACH. SP.
COMP. AIR
STERILIZER
AIR GAP
F.W. HYDROPHORE UNIT (TANK: 2m³, PUMP: 13m³/HR. T=55m)
TO BILGE WELL
DWG. NO. 411640|


"A"
"B"
"C"
POV-401,101,104
15 POV-104
SEC. "C" (ALL W.C. TO BE SIMILAR TO THIS)
FLUSH VALVE WITH VACUUM BREAKER (MAKER SUPPLY)
SOIL PIPE
SEC. "B" (P. & S. SIDE)
INSULATION
SEC. "A"
WINDOW
SPRAY NOZZLE
NAV. BR. DK.
NAV. BR. DK. (06)
DWG. NO. 411640|
24

1676

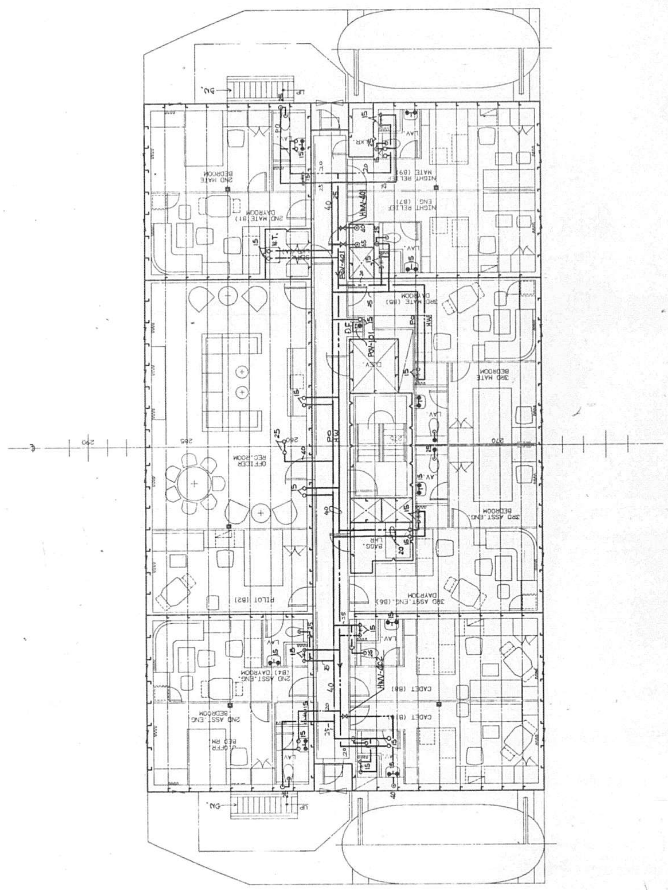


SR. OFFR'S DK.(05)
DWG. NO. 4116401
25
SEC. "D"
SEC. "G"

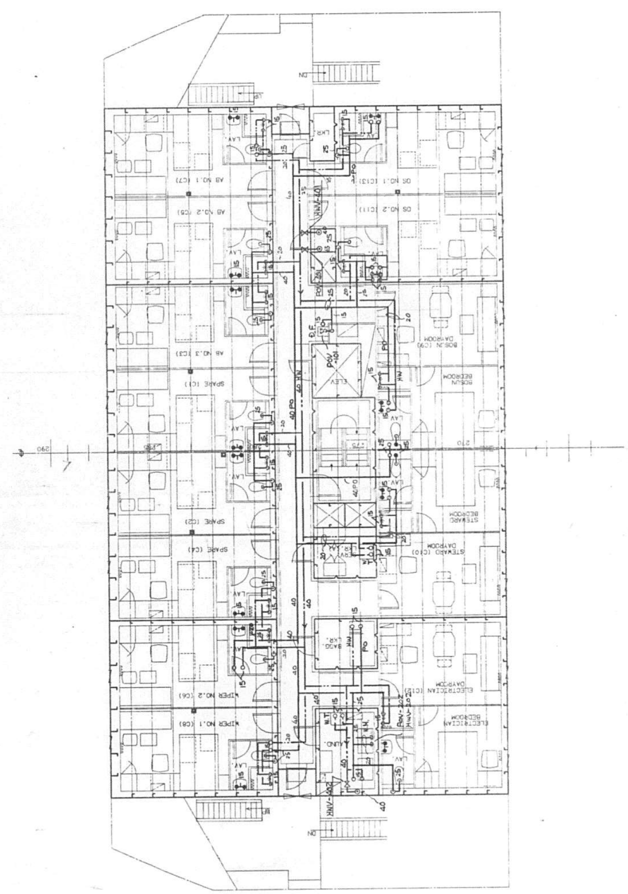


PASSENGER DK.(04)
DWG. NO. 4116401
26
SEC. "E"
ICE CUBE MAKER

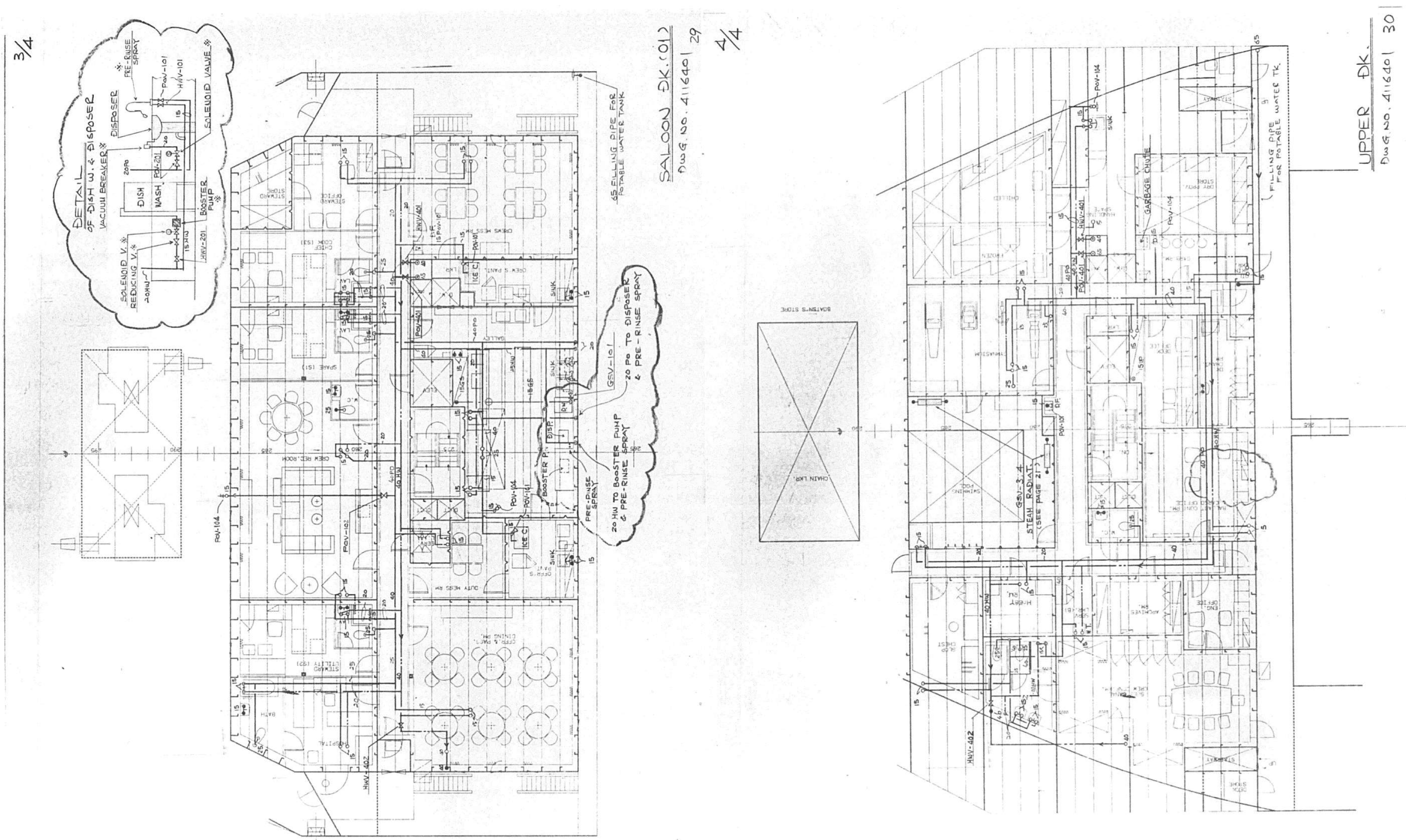
1677



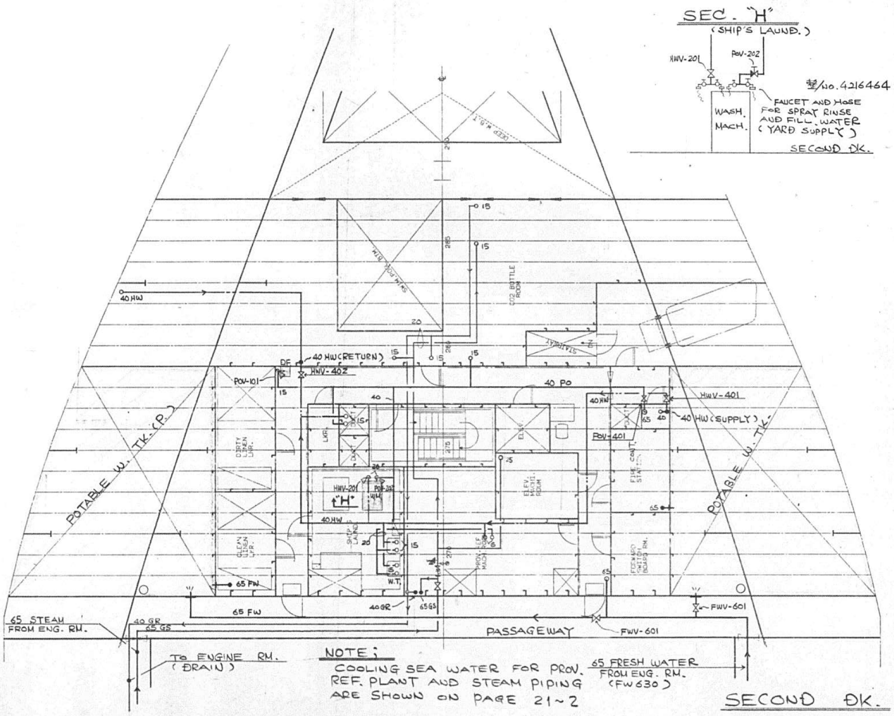
BOAT DK. (03)
DWG. NO. 4116401 27



CREW DK. (02)
DWG. NO. 4116401 28

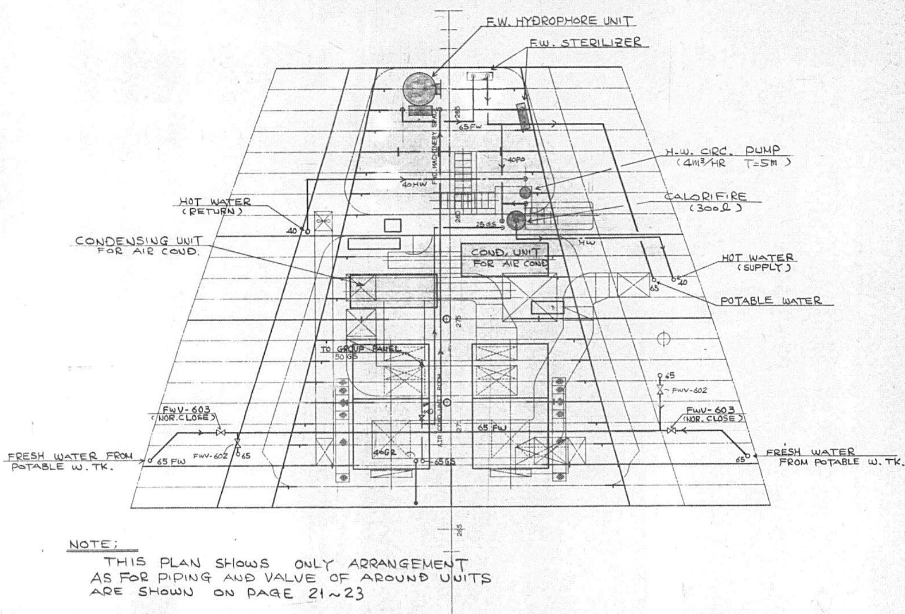


3/4
DETAIL OF DISH W. & DISPOSER
SALOON DK. (01)
DWG. NO. 4116401 29
4/4
65 FILLING PIPE FOR POTABLE WATER TANK
20 HW TO BOOSTER PUMP & PRE-RINSE SPRAY
20 PO TO DISPOSER & PRE-RINSE SPRAY
UPPER DK.
DWG. NO. 4116401 30
FILLING PIPE FOR POTABLE WATER TK.
GARBAGE CHUTE



SECOND DK.

DWG. NO. 411640l 31

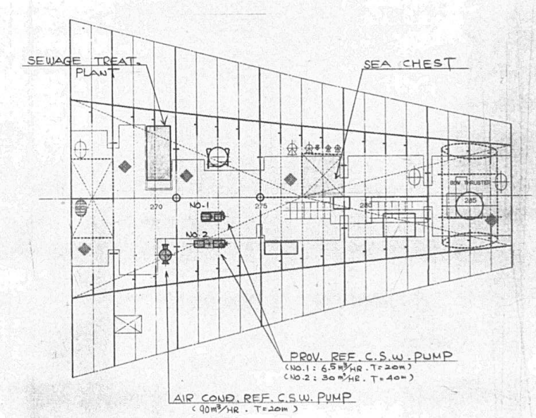


THIRD DK.

DWG. NO. 411640l 32.

1680

FWD. MACHINERY FLOOR



NOTE;

THIS PLAN SHOWS ONLY ARRANGEMENT AS FOR PIPING AND VALVE OF AROUND UNITS ARE SHOWN ON PAGE 21 ~ 23

DWG. NO. 411640i 33/33

1681

APPROVAL OF OWNER & REGULATORY BODIES						
ALT. NO.	OWNER		ABS			
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	(RECEIVED) MAR. 11 '85	DETS/NAB/TS	APR. 17 '85	7-8-[illegible]		
REV. 01	JUN. 28 '85	DET/MES 636	AUG. 8 '85	[illegible]		
REV. 02	OCT. 8 '85	TAM/85	NOV. [illegible] '85	[illegible]		
REV. 03	FEB. 2 '87	STAMPED ON DWG	MAR. 23 '87	7-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

機関部

冷却清水管系図

COOLING F.W. PIPING DIAGRAM
IN ENGINE ROOM

LYKES REF. NO. 480403 — MITSUI DRAWING NO. 5131016 — REV.

(12 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.No.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.No.1324 AND S.No.1325.	MAR. 26 '87

DWG.NO. 5131016 — 1

GENERAL NOTE

DWG.NO. 5131016 — 2

REFERENCE

NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480001	4116002	PIPING PRACTICE
	190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
	482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS
	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
	482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
	482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
	482608	5131205	GASKET (GENERAL USE)
	482604	5233111	CAST STEEL VALVES
	482606	5233112	FORGED STEEL VALVES
	482607	5233114	BRONZE VALVES
	482409	5233118	BUTTERFLY VALVES

DWG.NO. 5131016 — 3

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REFERENCE			
NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	~~480201~~	~~S131001~~	~~FEED & CONDENSATE PIPING DIAGRAM IN ENG. RM~~
	~~481001~~	~~S131002~~	~~STEAM AND EXHAUST PIPING DIAGRAM IN ENG. RM~~
	~~480802~~	~~S131008~~	~~STEAM DRAIN PIPING DIAGRAM IN ENG. RM~~
	~~481401~~	~~S131009~~	~~L.O. SERVICE PIPING DIAGRAM IN ENG. RM~~
	~~481402~~	~~S131012~~	L.O. TRANSFER & PURIFICATION PIPING ~~DIAGRAM IN ENG. RM~~
	~~481501~~	~~S131013~~	~~F.O. SERVICE PIPING DIAGRAM IN ENG. RM~~
	~~481509~~	~~S131014~~	~~F.O. TRANSFER PIPING DIAGRAM IN ENG. RM~~
	~~481502~~	~~S131015~~	~~F.O. PURIFICATION PIPING DIAGRAM IN ENG. RM~~
	~~480403~~	~~S131016~~	~~COOLING F.W. PIPING DIAGRAM IN ENG. RM~~
	~~480501~~	~~S131018~~	COOLING S.W. & S.W. SERVICE PIPING ~~DIAGRAM IN ENG. RM~~
	~~480301~~	~~S131019~~	~~FIRE G.S. & BALLAST PIPING DIAGRAM IN ENG. RM~~
	480102	S131020	BILGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENG. RM
	480401	S131023	F.W. SERVICE PIPING DIAGRAM IN ENG. RM
	~~481802~~	~~S131024~~	~~COMPRESSED AIR PIPING DIAGRAM IN ENG. RM~~
	~~481803~~	~~S131025~~	~~CONTROL AIR PIPING DIAGRAM IN ENG. RM~~
	~~481804~~	~~S131026~~	~~MAIN ENGINE REMOTE CONTROL AIR PIPING DIAGRAM IN ENG. RM~~
	~~520001~~	~~S131030~~	~~EXHAUST GAS PIPING DIAGRAM IN ENG. RM~~

CODED GROUP SYSTEM OF PIPING DIAGRAM

管系 (SYSTEM) \ 区分 (DIVISION)	記号および番号 (DIVISION OF SYMBOL NUMBER) 管 (PIPE)	弁コック こし器 (VALVE, COCK
冷却清水管系 COOLING FRESH WATER	2F-1 ~ 999	1FV-1 ~ 999
清水サービス, 飲料水および温水管系図 F.W. SERVICE, DRINKING & HOT WATER	1F-1 ~ 999	1FV-1 ~ 999
開放清水管系 OPEN FRESH WATER DRAIN	6F-1 ~ 999	6FV-1 ~ 999

5131010

SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT
		GATE (SLUICE) VALVE	:BUTT OR SOCKET WELDING ENDED
		BUTTERFLY VALVE	:UNION ENDED
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	
		SCREW DOWN CHECK VALVE	:LOCKED CLOSE :LOCKED OPEN
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE;
		PRESS. REDUCING VALVE (DIRECT OPERATING TYPE)	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
COCK		TWO-WAY COCK	:LOCKED CLOSE :LOCKED OPEN
		THREE-WAY COCK	
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER
		PISTON TYPE (ON-OFF CONTROL)	:WITH POSITIONER
		PISTON TYPE (OPEN DEGREE CONTROL)	:WITH MANUAL HANDLE
		ELECTRIC MOTOR TYPE	
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS.-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	● :WITH STOP VALVE ○ :WITHOUT VALVE :WITH SELF CLOSING VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	
		FLAT GLASS LEVEL GAUGE	
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE;
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	TANK
	L	LEVEL INDICATOR	
	VS	VISCOSITY INDICATOR	
	P	PRESSURE GAUGE	
	C	COMPOUND GAUGE	
	V	VACUUM GAUGE	
	Pd	DIFF. PRESS. GAUGE	
	T	THERMOMETER	
	T	REMOTE THERMOMETER	
	F	FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETECTOR	PS	PRESSURE SWITCH	
	TS	TEMPERATURE SWITCH	
	LS	LEVEL (FLOAT) SWITCH	
	FS	FLOW SWITCH	
	SC	SALINITY CELL	
		ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
	MS	MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

KIND	SYMBOL	NAME	REMARK
SAMPLE		---SYMBOL ---INSTRUMENT NO.	
INDICATOR	PI	PRESSURE INDICATOR	
	VI	VACUUM INDICATOR	
	CI	COMPOUND INDICATOR	
		DIFF. PRESS. INDICATOR	
	TI	TEMPERATURE INDICATOR	
	LI	LEVEL INDICATOR	
	VSI	VISCOSITY INDICATOR	
	DI	DENSITY INDICATOR	
		SALINITY INDICATOR	
	FI	FLOW INDICATOR	
	XI	OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL	PC	PRESSURE CONTROL	
	TC	TEMPERATURE CONTROL	
	LC	LEVEL CONTROL	
	VSC	VISCOSITY CONTROL	
	AC	AUTOMATIC CONTROL	
		EMER. SHUT DOWN	
		EMER. SLOW DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF
		AUTOMATIC START	
		AUTOMATIC STOP	
		AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM		HIGH PRESSURE ALARM	
	PAL	LOW PRESSURE ALARM	
		HIGH DIFF. PRESS. ALARM	
		HIGH TEMPERATURE ALARM	
	TAL	LOW TEMPERATURE ALARM	
		TEMP. DEVIATION HIGH ALARM	
	LAH	HIGH LEVEL ALARM	
	LAL	LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		HIGH VISCOSITY ALARM	
		LOW VISCOSITY ALARM	
		HIGH DENSITY ALARM	
		HIGH SALINITY ALARM	
		OVER FLOW ALARM	
		NON FLOW ALARM	
	IA	GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

5131016

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131016

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
F.W. OPEN DRAIN & AIR VENT LINE (6F-1~90) (6F-151~200)	200	8	216.3	8.2	WELDED CARBON STEEL PIPE STPG 38 E Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)	—	—	—	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	38°C (100°F)	0 K
	150	6	165.2	7.1										
	125	5	137.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7										
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.1										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-O JIS H 3300 (EQUIVALENT TO ASTM B88 C12200)		CAST BRONZE FLARED JOINT BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	—	—	—		CAST BRONZE FLARED JOINT BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)		
	6	¼	8.0	1.2										

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131016

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
LOW TEMP COOL. F.W. LINE	350	14	355.6	[illegible]	WELDED CARBON STEEL PIPE (STD)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL ASTM A105 or BUTT WELDING	JIS 10K (143psi)	CAST STEEL FLANGED SC 46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WC A) BUTTERFLY V.: CAST STEEL SCPH 2 JIS G 5151 (EQUIVALENT TO ASTM A216 WCB)	DISC & SEAT; SUS FACED ON CAST ST. OR STAINLESS STEEL SCS 13 JIS G 5121 (EQUIVALENT TO ASTM A351 CF8) OR BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62) STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	75°C (167°F) ~ 45°C (113°F)	4K (57psi)
	300	12	318.5	[illegible]	STPG 38E JIS G 3454									
(2F-1~200)	250	10	267.4	[illegible]	(EQUIVALENT TO ASTM A53 GrA)									
	200	8	216.3	8.2										
	150	6	165.2	7.1										
HIGH TEMP COOL. F.W. LINE	125	5	139.8	6.6										
	100	4	114.3	6.0	PARKERIZING (Sch.40)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)					PARKERIZING	85°C (185°F) ~ 67°C (153°F)	
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
(2F-201~300)								JIS 16K (228psi)	CAST BRONZE FLANGED BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	BUTTERFLY V.: DISC; SCS 13 A JIS G 5121 (EQUIVALENT TO ASTM A351 Gr. CF8) SEAT; NBR or EPT				
	40	1½	48.6	3.7										
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.1										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-O JIS H 3300 (EQUIVALENT TO ASTM B88 C12200)		CAST BRONZE FLARED JOINT BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC & STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)		CAST BRONZE FLARED JOINT BC 6 JIS H 5111 (EQUIVALENT TO ASTM B62)		
	6	¼	8.0	1.2										

5131016

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SLEEVE JOINT

According to the yard's standard practice, Welding sleeve joints may be used with the limitation as mentioned hereafter.

1 Piping system to be applied

~~Exhaust steam line~~
~~Steam drain line (5D)~~
~~Exhaust gas line~~
~~Condensate water line~~

All air vent line (6F:1~100)
All open ended drain line (6F:1~100)
~~Apen bilge scupper line~~

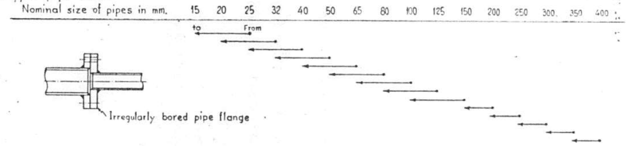
2 Nominal diameter of the pipe
15 mm and over

Reducing method of pipe diameter

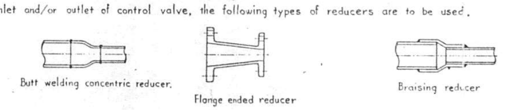
In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the difference of pipe size is within the following limits. → Irregularly bored pipe flanges shall only be used for vent piping, air piping and scupper pipe line.

Nominal size of pipes in mm. 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400



2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.



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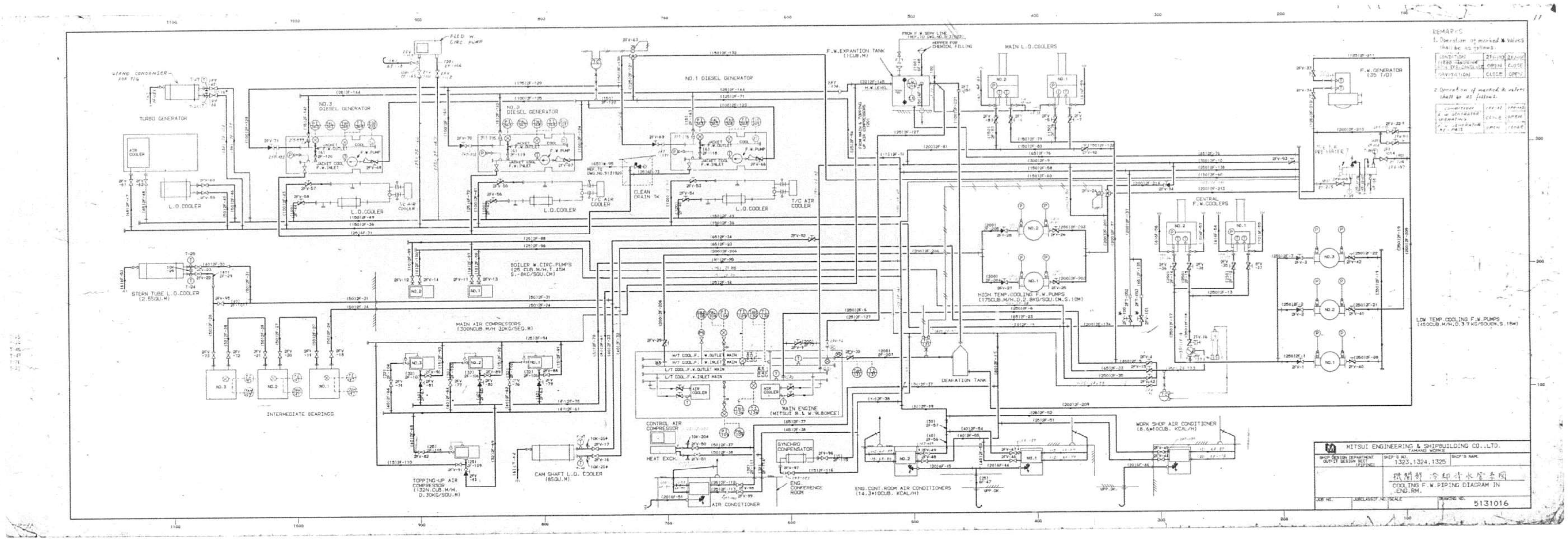
TURBO GENERATOR
L.O.COOLER
NO.3 DIESEL GENERATOR
NO.2 DIESEL GENERATOR
NO.1 DIESEL GENERATOR
CLEAN DRAIN TK
T/C AIR COOLER
F.W.EXPANTION TANK (1CUB.M)
MAIN L.O.COOLERS
F.W.GENERATOR
STERN TUBE L.O.COOLER
BOILER W.CIRC.PUMPS
HIGH TEMP.COOLING F.W.PUMPS
CENTRAL F.W.COOLERS
LOW TEMP.COOLING F.W.PUMPS
MAIN AIR COMPRESSORS
INTERMEDIATE BEARINGS
DEAERATION TANK
MAIN ENGINE
CONTROL AIR COMPRESSOR
HEAT EXCH.
SYNCHRO COMPENSATOR
ENG. CONFERENCE ROOM
AIR CONDITIONER
ENG.CONT.ROOM AIR CONDITIONERS
WORK SHOP AIR CONDITIONER
TOPPING-UP AIR COMPRESSOR
CAM SHAFT L.O. COOLER
MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT
OUTFIT DESIGN SECT (PIPING)
SHIP'S NO. 1323,1324,1325
SHIP'S NAME
機関部 冷却清水管系図
COOLING F.W.PIPING DIAGRAM IN ENG.RM.
JOB NO.
SCALE
DRAWING NO. 5131016

1686

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL						
REV.						

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER | SHIP'S NO. | SHIP'S NAME: TILLIE LYKES

OUTFIT DESIGN SECT (PIPING)

機関部

冷却海水および海水サービス管系図

COOLING S.W.& S.W.SERVICE PIPING DIAGRAM IN ENGINE ROOM

MITSUI ENGINEERING & SHIPBUILDING CO., LTD. SHIP DESIGN DEPARTMENT — NOV 10 1986

LYKES REF. NO. 480501 | MITSUI DRAWING NO. 5131018 | REV.

(10 SHEETS WITH COVER)

A4- B2-
A3- B1-
A2-

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S. No. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S. No. 1324 AND S. No. 1325.	JUN. 26 '86

DWG.NO. 5131018 — 1

GENERAL NOTE

DWG.NO. 5131018 — 2

REFERENCE DRAWING

NO.	REV. NO.	DWG. NO.	DWG. NAME

DWG.NO. 5131018 — 3

CODED GROUP SYSTEM OF PIPING DIAGRAM

区分 (DIVISION) / 管系 (SYSTEM)	記号および番号 (DIVISION OF SYMBOL NUMBER)	
	管 (PIPE)	弁.コック.こし器 (VALVE, COCK)
主冷却海水管系 MAIN COOLING SEA WATER	7W-1 ~ 999	7WV-1 ~ 999
発電機および雑用冷却海水管系 AUX. & MISCELL. COOLING SEA WATER	8W-1 ~ 999	8WV-1 ~ 999
排水管系 OPEN BILGE	9W-1 ~ 999	9WV-1 ~ 999
船体外板付弁および吐捨弁 SEA SUC. & OVERBOARD DIS. VALVE	—	LWV-1 ~ 999

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SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT
		GATE (SLUICE) VALVE	:BUTT OR SOCKET WELDING ENDED
		BUTTERFLY VALVE	:UNION ENDED
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	:LOCKED CLOSE
		SCREW DOWN CHECK VALVE	:LOCKED OPEN
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE;
		PRESS. REDUCING VALVE DIRECT OPERATING TYPE	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
		DUO CHECK VALVE	
COCK		TWO-WAY COCK	:LOCKED CLOSE
		THREE-WAY COCK	:LOCKED OPEN
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER
		PISTON TYPE (ON-OFF CONTROL)	:WITH POSITIONER
		PISTON TYPE (OPEN DEGREE CONTROL)	:WITH MANUAL HANDLE
		ELECTRIC MOTOR TYPE	
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS.-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	● :WITH STOP VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	○ :WITHOUT VALVE; :WITH SELF CLOSING VALVE
		FLAT GLASS LEVEL GAUGE	
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE;
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	TANK
	L	LEVEL INDICATOR	
	VS	VISCOSITY INDICATOR	
	P	PRESSURE GAUGE	
	C	COMPOUND GAUGE	
	V	VACUUM GAUGE	
		DIFF. PRESS. GAUGE	
	T	THERMOMETER	
	T	REMOTE THERMOMETER	
	F	FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETECTOR	PS	PRESSURE SWITCH	
	TS	TEMPERATURE SWITCH	
	LS	LEVEL (FLOAT) SWITCH	
	FS	FLOW SWITCH	
	SC	SALINITY CELL	
		ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
		MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

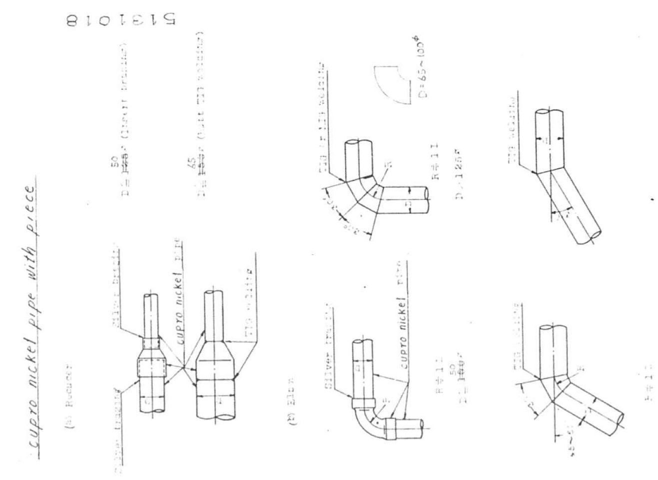
KIND	SYMBOL	NAME	REMARK
SAMPLE		---SYMBOL ---INSTRUMENT NO.	
INDICATOR	PI	PRESSURE INDICATOR	
	VI	VACUUM INDICATOR	
	CI	COMPOUND INDICATOR	
		DIFF. PRESS. INDICATOR	
	TI	TEMPERATURE INDICATOR	
	LI	LEVEL INDICATOR	
	VSI	VISCOSITY INDICATOR	
	DI	DENSITY INDICATOR	
		SALINITY INDICATOR	
	FI	FLOW INDICATOR	
	XI	OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL	PC	PRESSURE CONTROL	
	TC	TEMPERATURE CONTROL	
	LC	LEVEL CONTROL	
	VSC	VISCOSITY CONTROL	
	AC	AUTOMATIC CONTROL	
		EMER. SHUT DOWN	
		EMER. SLOW DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF
		AUTOMATIC START	
		AUTOMATIC STOP	
		AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM		HIGH PRESSURE ALARM	
	PAL	LOW PRESSURE ALARM	
		HIGH DIFF. PRESS. ALARM	
		HIGH TEMPERATURE ALARM	
	TAL	LOW TEMPERATURE ALARM	
		TEMP. DEVIATION HIGH ALARM	
		HIGH LEVEL ALARM	
	LAL	LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		HIGH VISCOSITY ALARM	
		LOW VISCOSITY ALARM	
		HIGH DENSITY ALARM	
		HIGH SALINITY ALARM	
		OVER FLOW ALARM	
		NON FLOW ALARM	
	IA	GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131018

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
BILGE OPEN DRAIN & AIR VENT LINE (9W-1~100)	200	8	216.3	8.2	WELDED CARBON STEEL PIPE STPG 38 E Sch40 JIS G 3454 Sch40 (EQUIVALENT TO ASTM A53 GrA sch40) GALVANIZED	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36) OR BUTT WELDING OR SLEEVE JOINT	JIS 10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA)	DISC & SEAT: CAST BRONZE BC6 JIS H5111 (EQUIVALENT TO ASTM B62) STEM: STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE GALVANIZED	45°C (113°F)	0K (0psi)
	150	6	165.2	7.1										
	125	5	139.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)					
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9	-									
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-0 JIS H3300 (EQUIVALENT TO ASTM B88 C12200-0)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46600) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT: CAST BRONZE BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641B JIS H3250 (EQUIVALENT TO ASTM B21 UNSC 46600) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62)		
	6	¼	8.0	1.2										

5131018



MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131018

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
COOLING S.W LINE (7W-1~100 8W-1~100)	500	20	516.94	4.47	90-10 COPPER NICKEL PIPE 90-10 CU NI C7060T JIS H3300 (EQUIVALENT TO ASTM B466/467 C70600) ASTM B467	10K (143PSI)	COMPOSITE FLANGE (TIG WELDING) INNER FLANGE ASTM B168 C95600 OUTER FLANGE 65~150 JIS G 3101 SS41 (EQUIVALENT TO ASTM A36) 200~500 JIS G 3201 SF50A (EQUIVALENT TO ASTM A105) 65 & ABOVE	JIS 10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA) SHOT BLAST & TAR EPOXY COATED FOR ORDINARY V.	DISC ALBC2 JIS H5114 (EQUIVALENT TO ASTM B148 C95400)	JIS 10K (143psi)	REFER TO PAGE 9-10	50°C (122°F)	3.5K (50psi)
	400	16	414.53	4.06										
	350	14	363.73	4.06										
	300	12	312.12	3.66										
	250	10	260.50	3.25										
	200	8	208.48	2.64										
	125	5	131.67	2.33	ASTM B466		CAST BRONZE BRAZING FLANGE BC7 JIS H5111 (EQUIVALENT TO ASTM B61) 50 & BELOW		CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT = CAST BRONZE BC6 (ASTM B62) STEM = STAINLESS ST. SUS 304 (ASTM A276 TP304)				
	80	3	79.86	1.82										
	50	2	54.05	1.62										
	40	1½	40.95	1.42				16K (228 PSI)						
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-0 JIS H3300 (EQUIVALENT TO ASTM B88 C12200)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641B JIS H3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT CAST BRONZE BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS 30K (428psi)	NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62)		
COOLING S.W. LINE (F.W. GEN. EJECT. PUMP DIS.) (8W-101~150)	6	¼	8.0	1.2										7K (100psi)

5131018

MATERIAL TABLE (S. No. 1323/4/5) ~~REFERENCE~~ DWG. No. 5131018

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
SHELL PIECE ATTACHED ON HULL	500	20	525	22	STEEL PLATE BUILT UP P-AAS	10K (143PSI)	STEEL SLIP-ON WELDED FLANGE SS41 JIS G3101 (EQUIVALENT TO ASTM A36)	JIS 10K (143PSI)	CAST STEEL FLANGED SC49 JIS G5101 (EQUIVALENT TO ASTM A216 WCA)	DISC: ALBC2 JIS H5114 (EQUIVALENT TO ASTM B148 C95400)	COOL. F.W. BUTTERFLY V.	—	38°C (100°F)	1K/cm² (14psi)
	450	18	475	22										
	400	16	425	22										
	350	14	370	22										
	300	12	320	22										
	250	10	267.4	21.4	SEAMLESS STEEL PIPE STS 38-S JIS G3455 (EQUIVALENT TO ASTM A106 GrA)					DISC & SEAT = STAINLESS ST. SCS13 JIS G5121 (EQUIV. TO ASTM A351 CF8) STEM = STAINLESS ST. SUS 304 JIS G4303 (EQUIV. TO ASTM A276 TP304)	OTHER BUTTERFLY V.			
	200	8	216.3	18.2										
	150	6	165.2	14.3										
	125	5	139.8	12.7										
	100	4	114.3	11.1										
	80	3	101.6	12.7										
	65	2½	89.1	12.0										
	50	2	76.3	11.0										
	40	1½	60.5	10.0				JIS 16K (227PSI)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC & SEAT CAST BRONZE BC6 JIS H5111 (EQUIVALENT TO ASTM B62) STEM = STAINLESS ST. SUS 304 JIS G4304 (EQUIVALENT TO ASTM B62)				
	32	1¼	48.6	10.0										
	25	1	42.7	10.0										

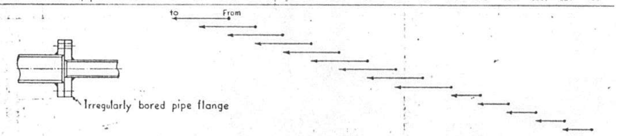
5131018

Reducing method of pipe diameter

In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

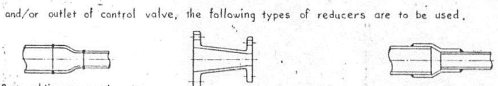
1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the differende of pipe size is within the following limits. → *Irregularly bored pipe flanges shall only be used for vent piping, air piping and scapper pipe line.*

Nominal size of pipes in mm. 15 20 25 32 40 50 65 80 100 125 150 200 250 300. 350 400



Irregularly bored pipe flange

2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.



Butt welding concentric reducer. Flange ended reducer Braising reducer

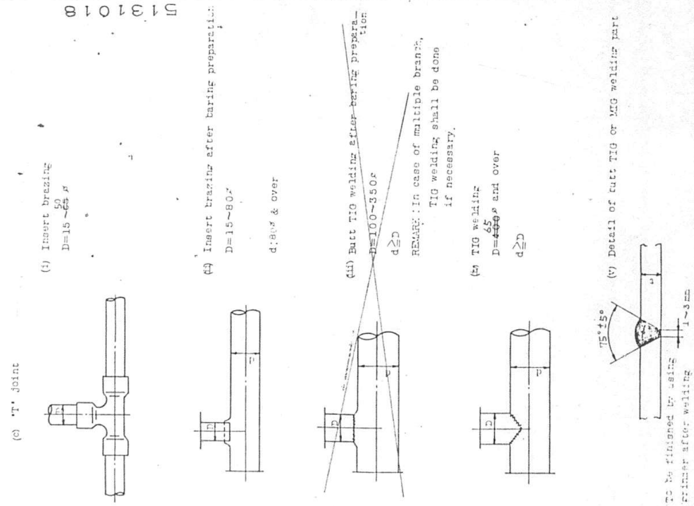
5131018

11

10

5131018

(c) 'T' joint



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5131018

SLEEVE JOINT (FOR STEEL PIPE)

According to the yard's standard practice,
Welding sleeve joints may be used with the limitation as mentioned hereafter.

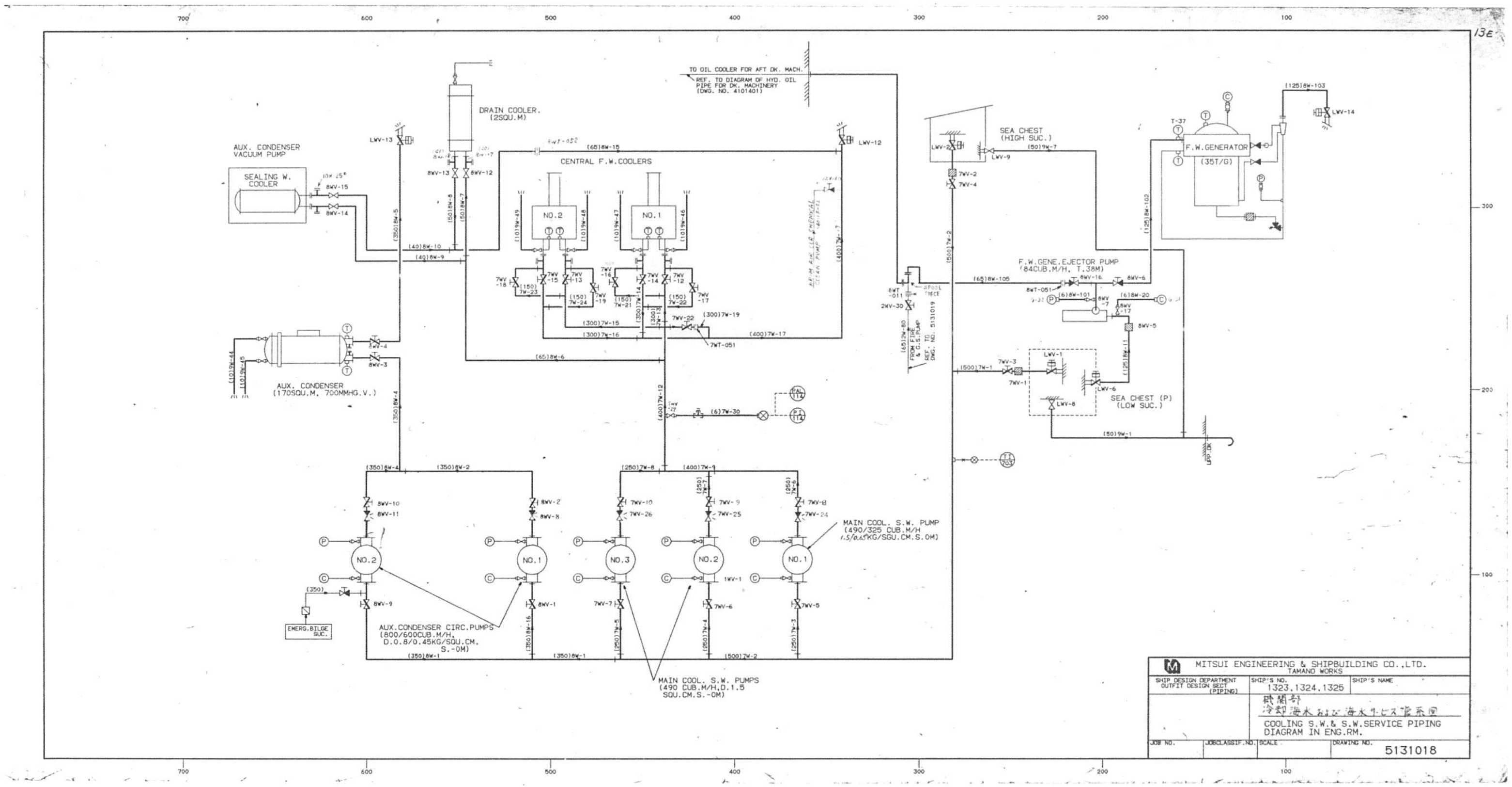
1 Piping system to be applied

Exhaust steam line
Steam drain line (5D)
Exhaust gas line
Condensate water line

All air vent line
All open ended drain line (9W-1~60)
Apen bilge scupper line

2 Nominal diameter of the pipe
15 - 300 mm

169


DRAIN COOLER.
(2SQU.M)
AUX. CONDENSER VACUUM PUMP
SEALING W. COOLER
CENTRAL F.W.COOLERS
NO.2
NO.1
TO OIL COOLER FOR AFT DK. MACH.
REF. TO DIAGRAM OF HYD. OIL PIPE FOR DK. MACHINERY (DWG. NO. 4101401)
SEA CHEST (HIGH SUC.)
F.W.GENERATOR
(35T/G)
F.W.GENE.EJECTOR PUMP (84CUB.M/H, T.38M)
AUX. CONDENSER (170SQU.M, 700MMHG.V.)
SEA CHEST (P) (LOW SUC.)
MAIN COOL. S.W. PUMP (490/325 CUB.M/H 1.5/0.45KG/SQU.CM.S.-0M)
NO.2
NO.1
NO.3
NO.2
NO.1
EMERG.BILGE SUC.
AUX.CONDENSER CIRC.PUMPS (800/600CUB.M/H, D.0.8/0.45KG/SQU.CM. S.-0M)
MAIN COOL. S.W. PUMPS (490 CUB.M/H,D.1.5 SQU.CM.S.-0M)
MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT
OUTFIT DESIGN SECT (PIPING)
SHIP'S NO.
1323.1324.1325
SHIP'S NAME
機関部
冷却海水および海水サービス管系図
COOLING S.W.& S.W.SERVICE PIPING DIAGRAM IN ENG.RM.
JOB NO.
JOBCLASSIF.NO.
SCALE
DRAWING NO.
5131018

APPROVAL OF OWNER & REGULATORY BODIES						
ALT. NO.	OWNER		ABS (N.O)		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	24/MAY/1985	OFTS/445-463	31/MAY/1985	T-8-2	30/APR/1985	—
A	23/Oct/1985	TOM/WD/M.C	22/NOV/1985	T-8-2	3/Oct/1985	—

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NO. **1325** — SHIP'S NAME **TILLIE LYKES**

OUTFIT DESIGN SECT

居住区排水.污水管系統図

DIAGRAM OF DRAIN AND SOIL PIPE FOR ACCOMMODATION SPACE

(TEL 2235)

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.	REV.
TS 1323/24/25	—	480701	4116501	

(42 SHEETS WITH COVER)

PLAN RECORD			
REV. NO.	DATE	DESCRIPTION	CHECKED BY.
	5 OCT 1986	PREPARED FOR S.NO. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S.NO. 1324 AND S.NO. 1325	S. Nishigaki

GENERAL NOTE	
1	ALL STEEL PIPES SHALL BE GALVANIZED.

DWG.NO. 4116501

REFERENCE DRAWING			
NO.	LYKES REF. NO.	DWG. NO.	DWG. NAME
1	480001	4116002	PIPING PRACTICE
2	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
3	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
4	482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLT & NUTS
5	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
6	482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
7	482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
8	482407	5233114	BRONZE VALVES
9	481801	4117401	DIAGRAM OF VOICE TUBE AND COMP. AIR LINE
10	480402	4116401	DIAGRAM OF FRESH, HOT, POTABLE SEA WATER & STEAM PIPE FOR ACCOMM. USE
11	480702	4116505	SEWAGE TREATMENT PLANT
12	330102	4109110	ARRANGEMENT OF JOINER BHD, DK. COVERING & INSU
13	360101	4111501	PLUMBING FIXTURE
14	340101	4111601	GALLEY AND PANTRY ARRANGEMENT
15	340201	4111605	GALLEY & PANTRY FURNITURE
16	340202	4111610	GALLEY EQUIPMENT
17	340203	4111636	COLD WATER FOUNTAIN
18	340301	4113001	ARRANGEMENT OF REF. PROV. STORE
19	340202	4111610	GALLEY & LAUNDRY EQUIPMENT
20	482434	4116405-6	BUTTERFLY VALVES
21	360401	4A16959A	ARR. FOR GARBAGE ROOM

DWG.NO. 4116501

1693

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 4116501

SYSTEM	NOM. SIZE mm	NOM. SIZE Inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
SHELL PIECE ATTACHED ON HULL	65	2½	89.1	12.0	SEAMLESS STEEL P. STS 38-S JIS G 3455	JIS 10K (143PSI)	STEEL SLIP-ON WELDED FLANGE SS41 JIS G 3101 (EQUIV. TO ASTM A36)	—	—	—	—	—	38°C (100°F)	1K (14PSI)
	100	4	114.3	11.1	(EQUIV. TO ASTM A106 GRADE A)									
	450	18	475	22.0	STEEL PL. ABS A CLASS STEEL SEMI KILLED									

FITTING LIST

SYMBOL	NAME	PRESS KG/cm²	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA MM	NOM. DIA INCH	QUANTITY	LIST NO.	REMARKS
	GATE VALVE (ELECT. MOTOR OPERATED)				CAST STEEL SC46 OR 49 JIS G 5101 (EQUIV. TO ASTM A216 GRADE WCA)	450	18	1	ADV-914	SEE PAGE 26
	BUTTERFLY VALVE	JIS 10K (143PSI)	CAST STEEL SC46 OR 49 JIS G 5101 (EQUIV. TO ASTM A216 GRADE WCA)	STAINLESS STEEL 304 JIS 4303 (EQUIV. TO ASTM A276 TYPE 304)	CAST BRONZE BC6 JIS H 5111 (EQUIV. TO ASTM B62) OR STAINLESS STEEL SCS 13 JIS G 5121 (EQUIV. TO ASTM A351 CF8)	50	2	2	ADV-916, 917	"SEE OTHER DRAWING" (DWG. NO. 4116405)
	PISTON TYPE (ON-OFF CONT.) REMOTE CONT. BUTTERFLY VALVE					100	4	1	SOV-913	"SEE OTHER DRAWING" (DWG. NO. 4116406)

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 4116501

SYSTEM	NOM. SIZE mm	NOM. SIZE Inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
AIR VENT DRAINAGE SOIL PIPE & GARBAGE CHUTE IN ACCOMMODATION	15	½	21.7	2.8	WELDED CARBON STEEL PIPE STPG 38-E SCH. 40 JIS G 3454 GALVANIZED (EQUIVALENT TO ASTM A53-GR.A)	JIS 10K (143PSI)	STEEL SLIP-ON WELD. FLANGE SS41 JIS G 3101 (EQUIVALENT TO ASTM A36) OR SLEEVE STS 38-S JIS G 3455 (EQUIVALENT TO ASTM A106 GR.A)	SEE "FITTING LIST"			JIS 10K (143PSI)	BRANCH FABLICATED BY WELDING PIPE TO PIPE	38°C (100°F)	1.6K (23PSI)
	20	¾	27.2	2.9										
	25	1	34.0	3.4										
	32	1¼	42.7	3.6										
	40	1½	48.6	3.7										
	50	2	60.5	3.9										
	65	2½	76.3	5.2										
	80	3	89.1	5.5										
	100	4	114.3	6.0										
	450	18	457.2	14.3										
AIR VENT DRAINAGE & SOIL PIPE IN: *BATT. RM, *EL. RM, *RADIO RM, *MESS RM, *PANT., *GALLEY, *FROZEN, *CHILLED HAND. SPACE, *DRY. PROV. STORE, *EMG SW. BD RM. & BELOW 2ND. DK	15	½	21.7	3.7	WELDED CARBON STEEL PIPE STPG 38-E SCH-80 JIS G 3454 GALVANIZED (EQUIVALENT TO ASTM A53-GR.A)		SLEEVE STS 38-S JIS G 3455 (EQUIVALENT TO ASTM A106 GR.A) (* MARK ROOM ONLY) / STEEL SLIP-ON WELD. FLANGE SS41 JIS G 3101 (EQUIV. TO ASTM A36) OR SLEEVE (BELOW 2ND DK)							
	25	1	34.0	4.5										
	32	1¼	42.7	4.9										
	40	1½	48.6	5.1										
	50	2	60.5	5.5										
	65	2½	76.3	7.0										
	80	3	89.1	7.6										
	100	4	114.3	8.6										

FITTING LIST

SYMBOL	NAME	PRESS KG/cm²	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA MM	NOM. DIA INCH	QUANTITY	LIST NO.	REMARKS
	GATE VALVE	JIS 10K (143PSI)	CAST STEEL SC46 OR 49 JIS G 5101 (EQUIV. TO ASTM A216 GRADE WCA)	STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	CAST BRONZE BC6 JIS H 5111 (EQUIV. TO ASTM B62) OR STAINLESS STEEL SCS13 JIS G 5121 (EQUIV. TO ASTM A351-CF8)	50	2	4	SOV-910, 911 SOV-903, 904	SEE PAGE 10
						100	4	6	SOV-998, 999 ADV-910, 912 ADV-913, 915	
						80	3	1	SOV-918	
						40	1½	2	SOV-919, 920	
	VERTICAL STORM VALVE (AUTOMATIC NON RETURN VALVE)	JIS 10K (143PSI)	CAST STEEL SC46 OR 49 JIS G 5101 (EQUIV. TO ASTM A216 GRADE WCA)	(ROD) STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	(VALVE) CAST BRONZE BC6 JIS H 5111 (EQUIV. TO ASTM B62) OR STAINLESS STEEL SCS13 JIS G 5121 (EQUIV. TO ASTM A351-CF8)	100	4	3	ADV-905, 906, 907	SEE PAGE 11
	ANGLE STORM VALVE (AUTOMATIC NON RETURN VALVE)					50	2	1	ADV-909	SEE PAGE 12.
						65	2½	1	ADV-901	
						100	4	5	ADV-902, 903 ADV-908 SOV-901, 902	
	FLOAT CHECK VALVE	JIS 10K (143PSI)	CAST BRONZE BC6 JIS H 5111 (EQUIV. TO ASTM B62)	—	(FLOAT) STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A240 TYPE 304)	25	1	1	SOV-912	SEE PAGE 13
		JIS 10K (143PSI)	DUCTILE CAST IRON FCD 45 (EQUIV. TO ASTM A395)			50	2	1	ADV-918	SEE PAGE 14
	CHANGE-OVER VALVE	JIS 10K (143PSI)	DUCTILE CAST IRON FCD 45 JIS G 5502 (EQUIV. TO ASTM A395)	(CYLINDER) CAST BRONZE BC6 JIS H 5111 (EQUIV. TO ASTM B62)	(HANDLE) STAINLESS STEEL SUS 304 JIS G 4303 (EQUIV. TO ASTM A276 TYPE 304)	100	4	3	SOV-905, 906 ADV-919	SEE PAGE 15

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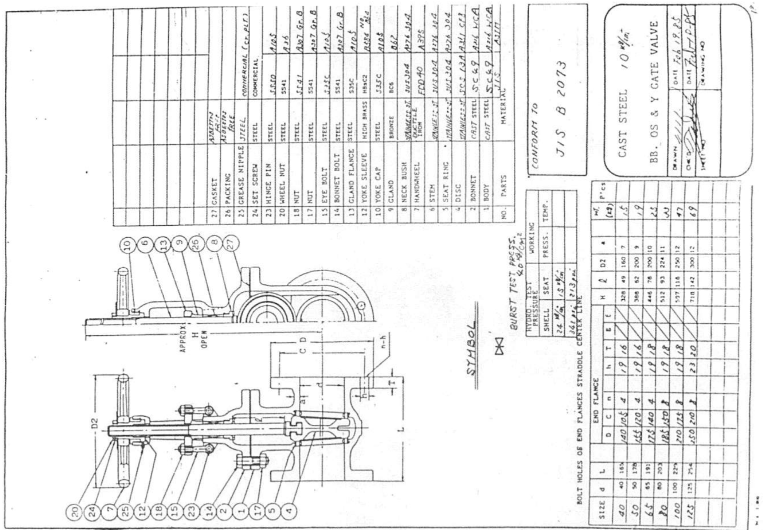
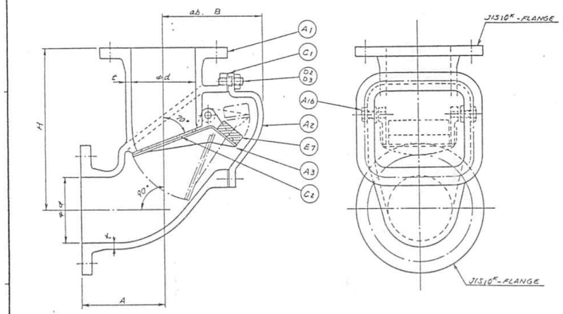
1694





FLANGE JIS 10 kg/cm² - FF
WATER TEST PRESSURE 5 kg/cm² (BODY & COVER)

REVISION

DIMENSION TABLE

NS NO	SIZE	d	t	H	A	B	WEIGHT kg
SV-SCA-50	50	50	8	170	90	100	11
〃 65	65	65	9	200	110	120	16.5
〃 80	80	80	9	220	120	135	21
〃 100	100	100	10	250	130	155	31
〃 125	125	125	11	270	150	180	45
〃 150	150	150	12	310	165	210	53
SV-SCA-200	200	200	13	400	190	260	107

SYMBOL

NC No	17	NS No	SV-SCA-

CAST STEEL ANGLE STORM VALVE

SCALE | SHEET No.

NIIKURA KOGYO CO., LTD.

APPROVED BY | DRAWN BY K. M
CHECKED BY E.T | DATE Oct. 27, 1983
DRAWN No. SV-SCA-SDT-A10

FITTING LIST

SYMBOL	NAME		PRESS KG/cm²	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA MM	NOM. DIA INCH	QUANTITY	LIST NO.	REMARKS
	ROSE PLATE	WATER SEAL		STPG 38-E JIS G 3454 (ASTM A53) Gr. A	(GRATING) BRASS CASTING YBsC2 (ASTM B584)		40	1½			SEE PAGE 16.
							50	2			SEE PAGE 17 18
		NON WATER SEAL		STPG 38-E (ASTM A53 Gr.A) OR STEEL PL. (SS41) (ASTM A36)			50	2			SEE PAGE 19
	SWEAT DRAIN						25	1			
	DRAIN PLUG WITH CHAIN			(SEAT) STEEL JIS G3101P (ASTM A36)	(PLUG) BRASS JIS H 5102 (ASTM B584)		24	0.945			SEE PAGE 20
							42	1.65			SEE PAGE 21
	BLANK FLANGE INTERNATIONAL SHORE CONNECTION			STEEL JIS G3101P (ASTM A36)			50	2	2	SOV-908,909	SEE PAGE 22
G.I.	GREASE INTERCEPTER		JIS 10K (143PSI)	CAST STEEL SC46 OR 49	—	—	100	4	1	ADV-911	SEE PAGE 25
	SCUPPER & DRAIN PIPE										
	SOIL PIPE										
	AIR VENT PIPE										
○	PIPE VERT. UP										
●	PIPE VERT. DOWN										
	PIPE VERT. UP & DOWN										

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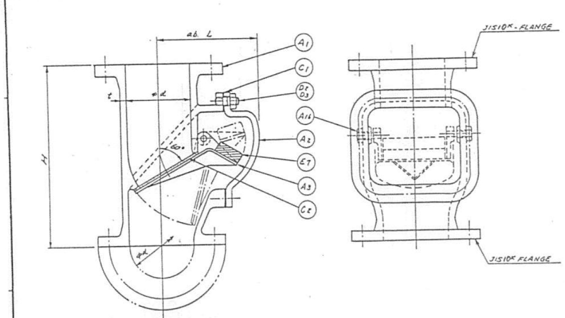


CONN. FLANGE JIS 10 kg/cm² - FF
WATER TEST PRESSURE 5 kg/cm² (BODY & COVER)

REVISION

DIMENSION TABLE

NS NO	SIZE	d	L	t	H	WEIGHT kg
SV-SC-50	50	50	100	8	210	10
〃 65	65	65	120	9	240	16
〃 80	80	80	135	9	260	19
〃 100	100	100	155	10	280	28.5
〃 125	125	125	180	11	330	42
〃 150	150	150	210	12	360	56
SV-SC-200	200	200	260	13	450	95

SYMBOL

NC No	17	NS No	SV-SC

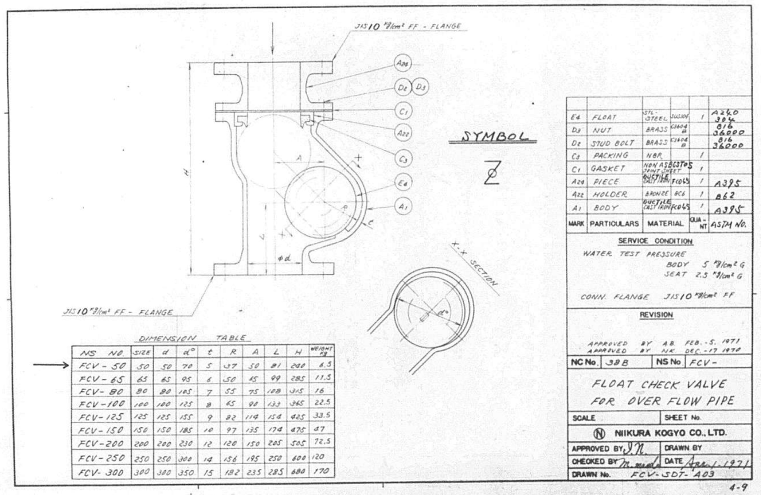
CAST STEEL VERTICAL STORM VALVE

SCALE | SHEET No.

NIIKURA KOGYO CO., LTD.

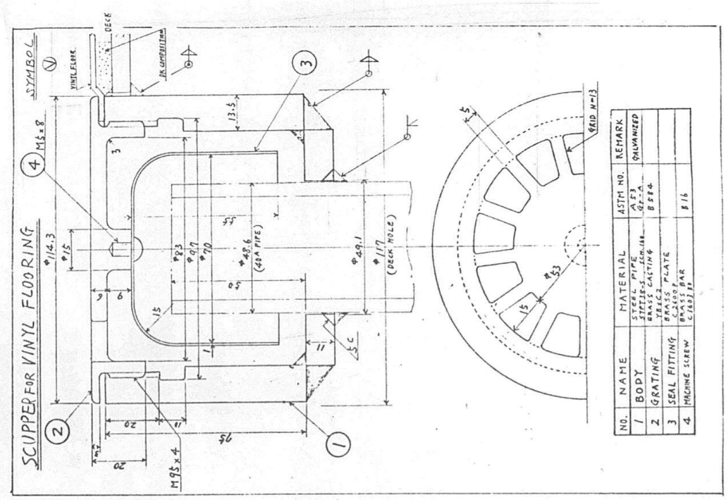
APPROVED BY | DRAWN BY K. M
CHECKED BY E.T | DATE Oct. 27, 1983
DRAWN No. SV-SC-SDT-A10

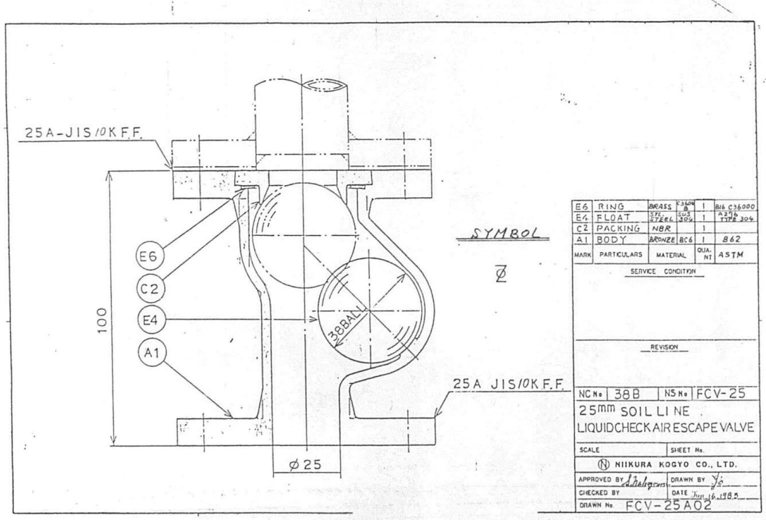
1695

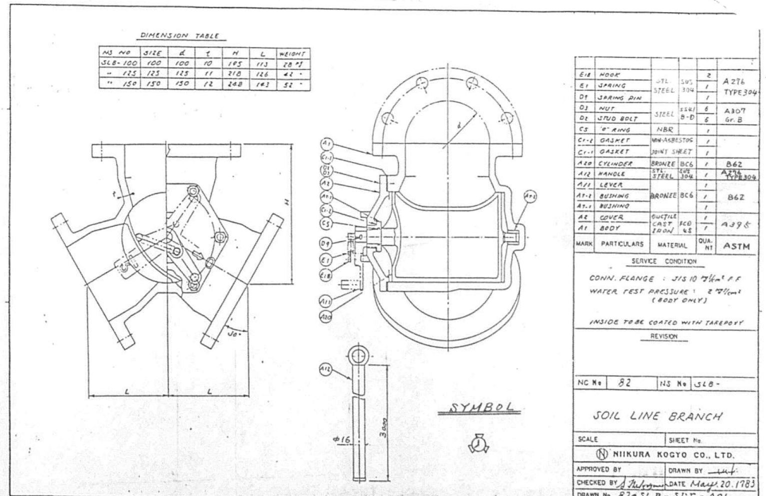


DIMENSION TABLE

NS NO.	SIZE	d	d°	t	R	A	L	H	WEIGHT kg
FCV-50	50	50	70	5	37	50	81	200	6.5
FCV-65	65	65	95	6	50	65	99	285	11.5
FCV-80	80	80	105	7	55	75	108	315	16
FCV-100	100	100	125	8	65	90	133	365	22.5
FCV-125	125	125	155	9	82	114	154	425	33.5
FCV-150	150	150	185	10	97	135	174	475	47
FCV-200	200	200	230	12	120	150	205	505	72.5
FCV-250	250	250	300	14	156	195	250	600	120
FCV-300	300	300	350	15	182	235	285	680	170







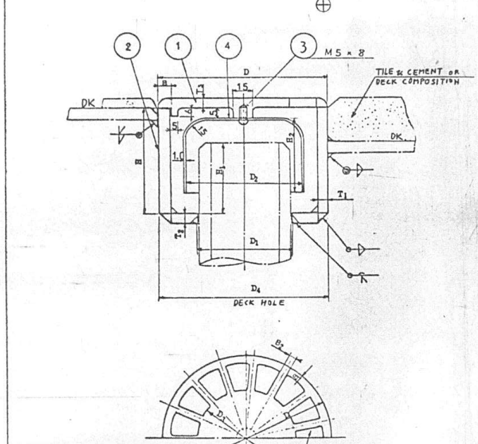
DIMENSION TABLE

NS NO	SIZE	d	t	H	L	WEIGHT
SLB-100	100	100	10	195	113	28 kg
" 125	125	125	11	218	126	42 "
" 150	150	150	12	248	143	52 "

17

SCUPPER FITTINGS FOR DK. COVERING

SYMBOL



NO.	NAME	MATERIAL	ASTM NO.
1	GRATING	BRASS CASTING YBsC2	B 584
2	BODY ※	STEEL PIPE STPG38-E SCH. 80	A 53 Gr-A
3	MACHINE SCREW	BRASS BAR C3603 BD	B 16
4	SEAL FITTING	BRASS PLATE C2600 P	

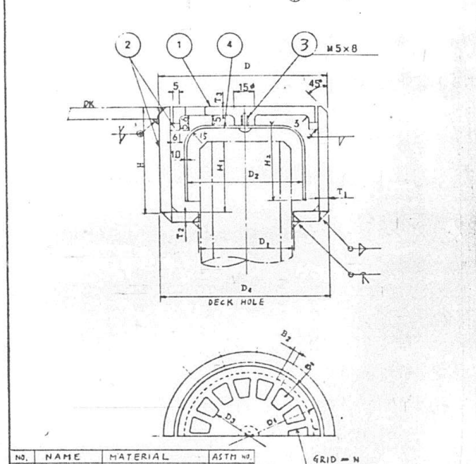
※ MARKED PARTS TO BE GALVANIZED

NOMI. DIA.	BODY D	D1	H	H1	T1	T2	GRATING D	D3	T3	B	B1	B2	GRID – N	SEAL FITTING D2	H2	DECK HOLE D4	WEIGHT (KG)	REMARK
50	139.8	61.1	112	89	9.5	10	129.8	66	6	10.5	6	6	15	95	97	142	3.61	
80	216.3	90.8	117	92	12.7	13	216.3	70	8	14	8	8	22	150	97	218	10.6	

18

SCUPPER FITTINGS FOR BARE ST. DK.

SYMBOL



NO.	NAME	MATERIAL	ASTM NO.
1	GRATING	BRASS CASTING YBsC2	B 584
2	BODY ※	STEEL PIPE STPG38-E SCH. 80	A 53 Gr-A
3	MACHINE SCREW	BRASS BAR C3603 BD	B 16
4	SEAL FITTING	BRASS PLATE C2600 P	

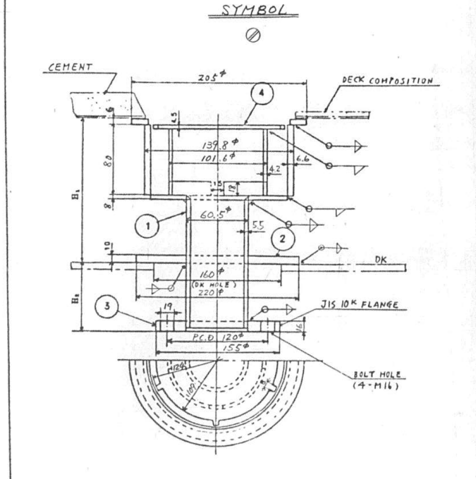
※ MARKED PARTS TO BE GALVANIZED

NOMI. DIA.	BODY D	D1	H	H1	T1	T2	GRATING D3	D1	T3	B1	B2	GRID – N	SEAL FITTING D2	H2	DECK HOLE D4	WEIGHT (KG)	REMARK
40	114.3	49.1	112	87	8.6	9	95	45	6	9	5	13	75	97	117	2.46	
50	139.8	61.1	112	89	9.5	10	116	70	6	9	6	15	95	97	142	3.61	

19

SCUPPER FITTINGS FOR REF. CHAMBERS

SYMBOL

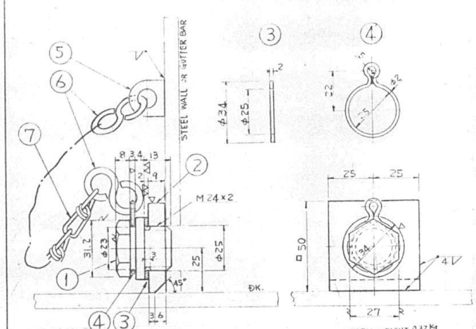


NO.	NAME	MATERIAL	ASTM NO.
1	BODY	STEEL PIPE (STPG38-E SCH80) & STEEL PLATE (SS41)	A53 Gr-A & A36
2	MIDDLE FLANGE	STEEL PLATE (SS41)	A36
3	PIPE FLANGE	STEEL PLATE (SS41)	A36
4	COVER	STEEL PIPE (SGP) & STEEL PLATE (SS41)	A53 Gr-A & A36

ALL PARTS TO BE GALVANIZED

20

SYMBOL



符号 No.	名称 NAME	材料 MATERIAL	QUANTITY	WEIGHT 1個 ONE	WEIGHT 合計 TOTAL	JIS NO.	ASTM NO.
7	鎖ひも CHAINLET ℓ=300	亜鉛めっき鉄線 GALV. IRON WIRE	1		0.016		
6	鎖ひもS形環 S RING OF CHAINLET	亜鉛めっき鉄線 GALV. IRON WIRE	2	0.0045	0.009		
5	アイプレート EYE PLATE	鋼板 STEEL	1		0.005	G3101	A36
4	鎖ひも用リング RING FOR CHAINLET	亜鉛めっき鉄線 GALV. IRON WIRE	1		0.003		
3	ガスケット GASKET	合成ゴム RUBBER	1		–		
2	座 PLUG SEAT	SS41 STEEL	1		0.146	G3101P	A36
1	プラグ PLUG	NBsB NAVAL BRASS	1		0.141	H5102	B584

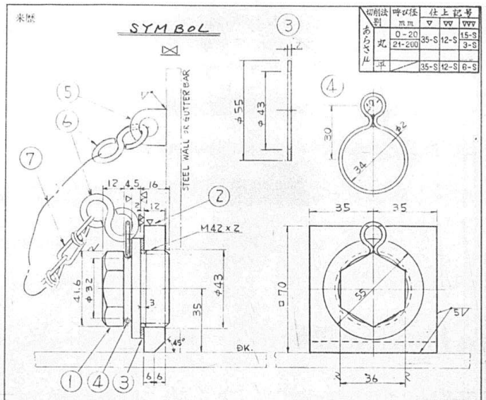
製造個数は 1 組分を示す

ドレンプラグ (M 24)
DRAIN PLUG (M 24)

SCALE 1/1.5

MITSUI SHIPBUILDING & ENGINEERING CO., LTD.

SYMBOL



TOTAL WEIGHT 0.695 kg

符号 No.	名称 NAME	材料 MATERIAL	試験片 TEST PIECE	常備 USE	予備 SPARE	合計 TOTAL	関係工場 WORK SHOP	1個 ONE	合計 TOTAL	JIS NO.	ASTM NO.
7	鎖ひも CHAINLET ℓ=300	亜鉛めっき鉄線 GALV. IRON WIRE				1			0.024		
6	鎖ひもS形環 S RING OF CHAINLET	亜鉛めっき鉄線 GALV. IRON WIRE				2		0.005	0.01		
5	アイプレート EYE PLATE	鋼板(GALV.) STEEL				1			0.005		
4	鎖ひも用リング RING FOR CHAINLET	亜鉛めっき鉄線 GALV. IRON WIRE				1			0.036		
3	ガスケット GASKET	合成ゴム RUBBER				1		—	—		
2	座 PLUG SEAT	SS41 STEEL				1			0.335	G3101P	A36
1	プラグ PLUG	NBsB NAVAL BRASS				1			0.285	H5102	3584

製造個数は 1 組分を示す

SHIP DESIGN DEPARTMENT | 工事番号 | 工事区分

SEC. CHIEF
ASSIST. CHIEF
CHARGE ENG'R
STAFF
DRAWER
DATE

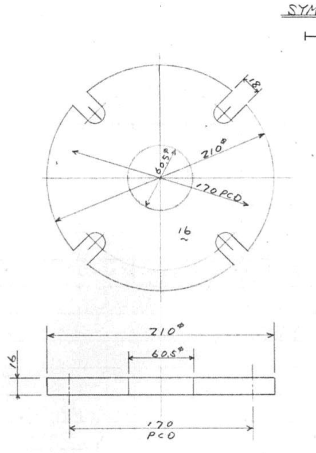
ドレン プラグ (M42)
DRAIN PLUG (M42)

試験方 TEST | SCALE 1/1.5 | CLASSIFICATION No | DRAWING No

A4 ト 2,000 51.6 Ⓢ **MITSUI SHIPBUILDING & ENGINEERING CO., LTD.**

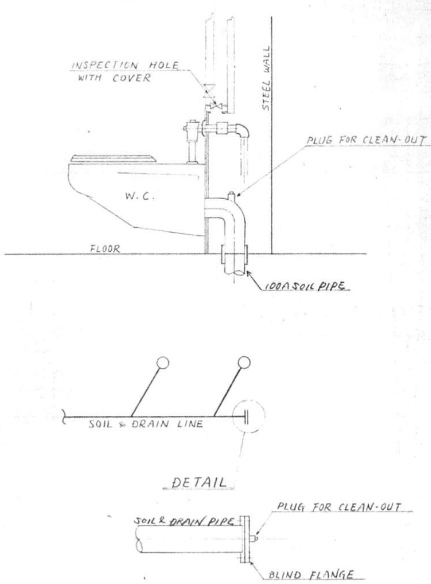
INTERNATIONAL SHORE CONNECTION

SYMBOL



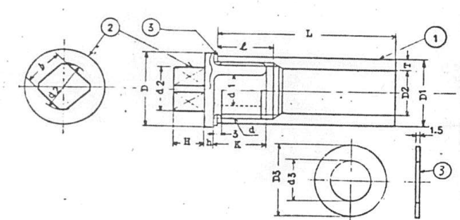
MATERIAL STEEL JIS G3101P (ASTM A36) SS41

CLEAN-OUT



CLEANING PLUG

NO.	NAME	MATERIAL	REMARKS	ASTM NO.
1	SEAT	CARBON STEEL PIPE	STPT38 SCH.160	A106 Gr-A
2	PLUG	BRASS	SUS 304	304
3	GASKET	RUBBER		



NOMI. DIA	PLUG								SEAT					GASKET	
	d	D	d1	d2	b	H	h	K	L	ℓ	D1	D2	T	D3	d3
24	M24×2	35	13	20	17	13	4.5	18	80	20	34	21.2	6.4	34	24
39	M39×2	50	27	22	17	18	6	18	110	20	48.6	34.4	7.1	49	39

CLEANING PLUG SHALL NOT BE FOR FOLLOWING ROOM.
BATT.RM, EL.RM, RADIO RM, MESS.RM, PANTRY, GALLEY
FROZEN, CHILLED, HAND SPACE, DRY PROV. STORE, FWD SN. BD RM

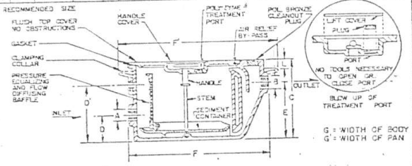
GREASE INTERCEPTOR FOR GALLEY DRAIN

SYMBOL [4.1]

DIMENSIONS SUBJECT TO MANUFACTURING TOLERANCE

SIZE	G.P.M.	GREASE CAP. LBS.	A I.P.S.	B I.P.S.	C	D	D'	E	F	F'	G	G'	L
100	4	8	1½*, 2	2*	10	[illegible]	[illegible]	[illegible]	[illegible]	—	[illegible]	—	—
200	7	14	1½*, 2	2*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1"
300	10	20	1½*, 2	2*	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
400	15	30	1½*, 2, 3	2*, 3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
500	20	40	1½*, 2, 3, 4	2*, 3, 4	15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
600	25	50	2*, 3, 4	2*, 3, 4	17	[illegible]	[illegible]	[illegible]	30½	[illegible]	[illegible]	[illegible]	[illegible]
700	35	70	2*, 3, 4	3*, 2, 4	18¾	4½	14¼	14¼	33	36½	23	25½	1¼
800	50	100	2*, 3, 4	3*, 2, 4	21½	4½	16	16	[illegible]	[illegible]	25	[illegible]	[illegible]

* RECOMMENDED SIZE



REGULARLY FURNISHED

SANI-COATED C.I. BODY AND BAFFLES. NON-SLIP SCORIATED ALUMINUM COVER. CADMIUM PLATED HANDLE AND STEM. FLOW CONTROL TEE (Z-1408)

~~ZE SAME AS ABOVE PLUS BRONZE TREATMENT PORT & AN INITIAL SUPPLY OF POLY-ZYME FURNISHED WITH EACH INTERCEPTOR.~~

LIST No. ADV-911

MATERIAL CAST STEEL

OPERATION OF Z-1170

ALL INTERCEPTORS WILL ACCUMULATE AND RETAIN A FIXED QUANTITY OF GREASE WHEN OPERATING AT RATED FLOW. ANY GREASE ENTERING INTERCEPTOR OVER AND ABOVE THIS POL MAXIMUM QUANTITY WILL BE PASSED INTO DRAINAGE SYSTEM UNTIL INTERCEPTOR IS CLEANED. TO CLEAN INTERCEPTOR REMOVE COVER AND SKIM OFF GREASE.

QUANTITY 1SET/SHIP

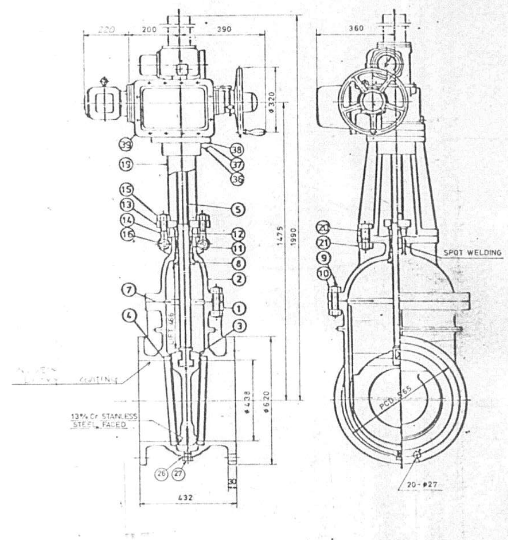
~~OPERATION OF ZE-1170~~

~~[illegible]~~

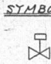
~~FOR GREASEPTOR WITH EXTENSION - SEE REVERSE SIDE~~

REGISTERED TRADE MARK

	PRODUCT NUMBER
REGULAR GREASEPTOR	Z-1170
~~POLY-ZYME SELF CLEANING GREASEPTOR~~	~~ZE-1170~~
© 1962 BY ZURN INDUSTRIES, INC. — ZURN INDUSTRIES, INC.	DRAWING NUMBER 36261
	DWG. No. (SK) 05605570



SYMBOL



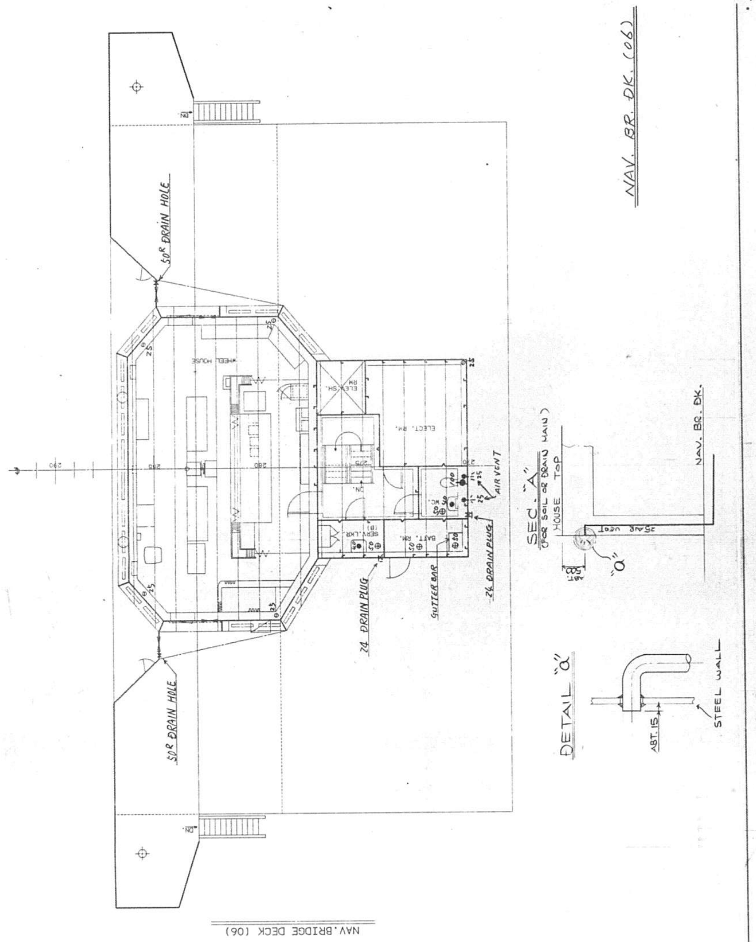
NO.	NAME	MATERIAL	JIS EQUIV. ASTM	PROD NO.	REMARK
39	VALVE CONTROL			1	
38	SPRING WASHER	SPRING STEEL	G 4801 - SUP 4	8	
37	NUT	MILD STEEL	G 3101 - SS 41 / A307 Gr. B	8	
36	BOLT	MILD STEEL	G 3101 - SS 41 / A307 Gr. B	8	
27	PLUG	STAINLESS STEEL	G 4303 - SUS 304 / A276 304	1	
26	GASKET	ASBESTOS FREE		1	
21	NUT	MILD STEEL	G 3101 - SS 41 / A307 Gr. B	4	
20	BOLT	MILD STEEL	G 3101 - SS 41 / A307 Gr. B	4	
19	YOKE	CAST STEEL	G 5101 - SC 49 / A216 WCA	1	
16	PIN	CARBON STEEL	G 4051 - S 45 C / A 266 CLASS 3	2	
15	NUT	MILD STEEL	G 3101 - SS 41 / A307 Gr. B	2	
14	EYE BOLT	MILD STEEL	G 3101 - SS 41 / A307 Gr. B	2	
13	GLAND FLANGE	CARBON STEEL	G 4051 - S 35 C / A105	1	
12	GLAND	BRONZE	H 5111 BC6 / B 62	1	
11	PACKING	ASBESTOS FREE		1set	
10	NUT	MILD STEEL	G 3101 - SS 41 / A307 Gr. B		
9	BOLT	MILD STEEL	G 3101 - SS 41 / A307 Gr. B		
8	BACK SEAT	STAINLESS STEEL	G 4303 - SUS 304 / A276 304	1	
7	GASKET	ASBESTOS FREE		1	
5	STEM	STAINLESS STEEL	G 4303 - SUS 304 / A276 304	1	
4	BODY SEAT	STAINLESS STEEL	G 4303 - SUS 304 / A276 304	2	
3	DISC	CAST STEEL	G 5101 - SC 49 / A 216 WCB	1	
2	BONNET	CAST STEEL	G 5101 - SC 49 / A 216 WCB	1	
1	BODY	CAST STEEL	G 5101 - SC 49 / A 216 WCB	1	

CAST STEEL 10 kgf/cm²

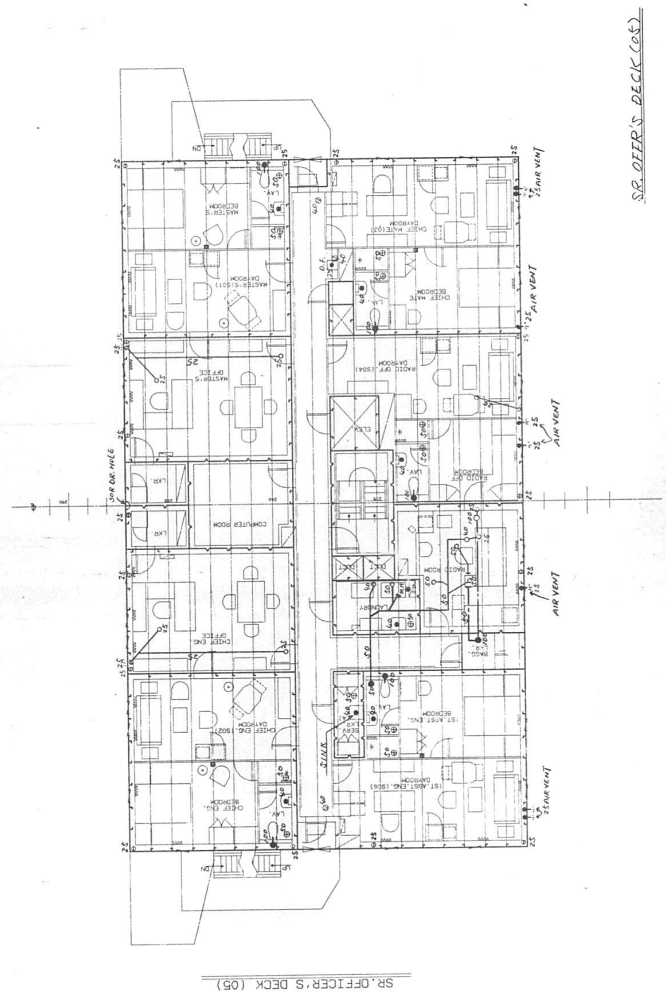
450 ELECTRIC MOTOR OPERATED GATE VALVE

OSAKA VALVE CO., LTD.

DATE 2 Mar 1979	HYDRAULIC TEST PRESSURE	BODY 24 kg/cm² SEAT 15
CHIEF OF SECT.	SHEET NO.	Burst Test press. 40 kg/cm²
CHECKED BY / DRAWING BY	DRAWN NO.	GE 311255

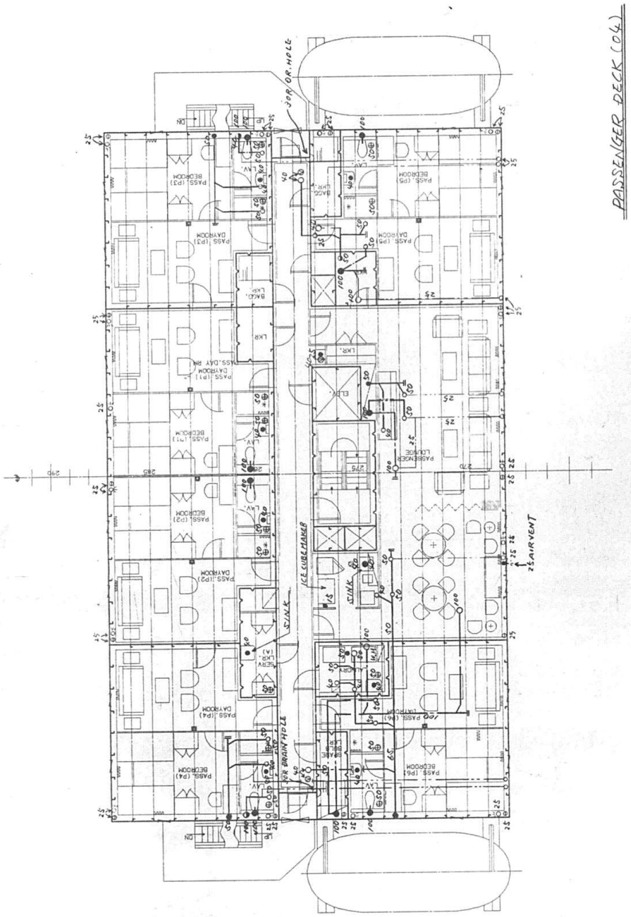


NAV. BR. DK. (06)
50A DRAIN HOLE
50A DRAIN HOLE
24 DRAIN PLUG
GUTTER BAR
26 DRAIN PLUG
AIR VENT
SEC. "A"
(FOR SOIL OR DRAIN MAIN)
HOUSE TOP
NAV. BR. DK.
"a"
DETAIL "a"
ABT. 15
STEEL WALL
NAV. BRIDGE DECK (06)



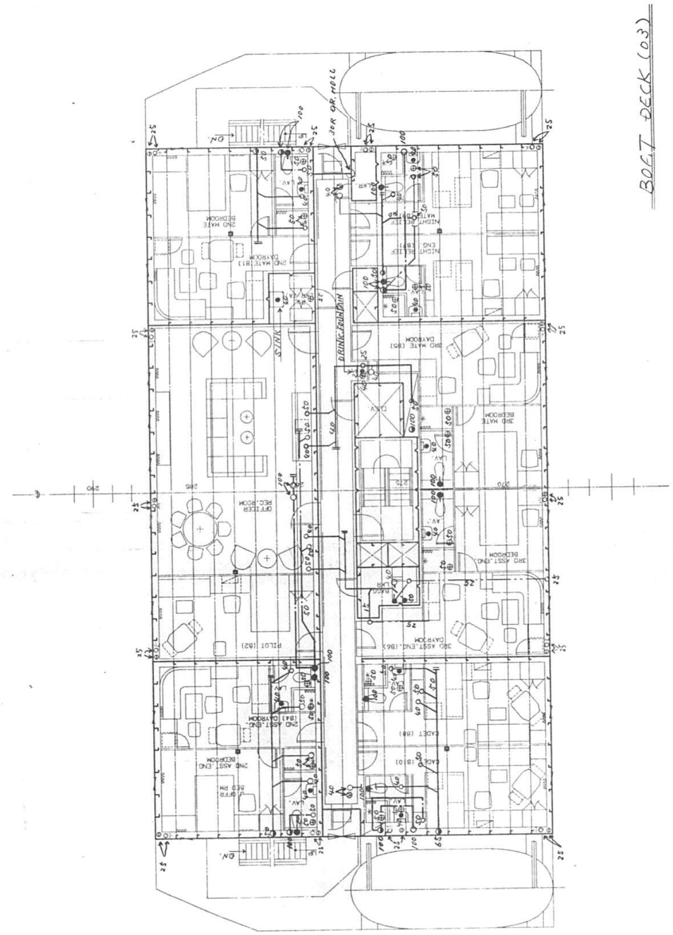
SR. OFFR'S DECK (05)
AIR VENT
AIR VENT
AIR VENT
AIR VENT
AIR VENT
COMPUTER ROOM
SR. OFFICER'S DECK (05)

29

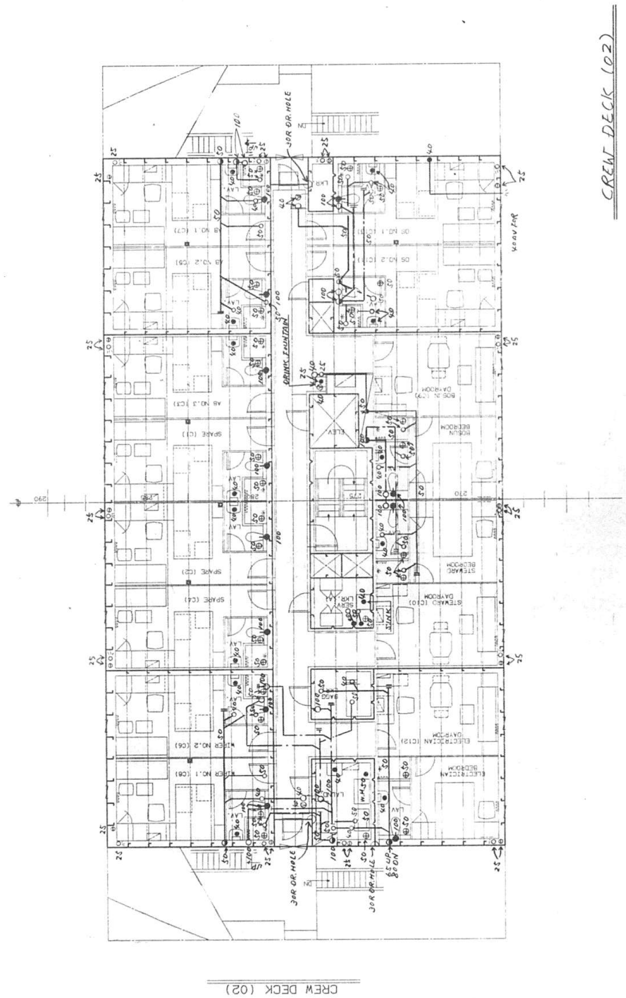


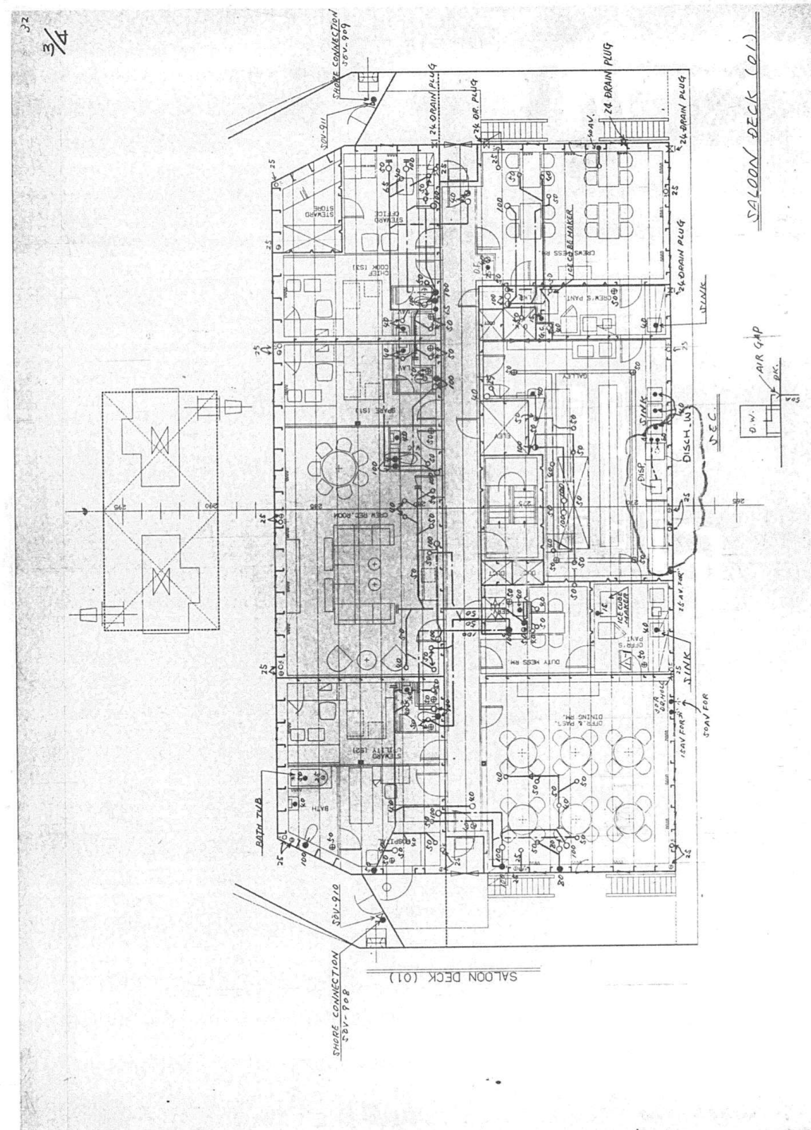
PASSENGER DECK (04)

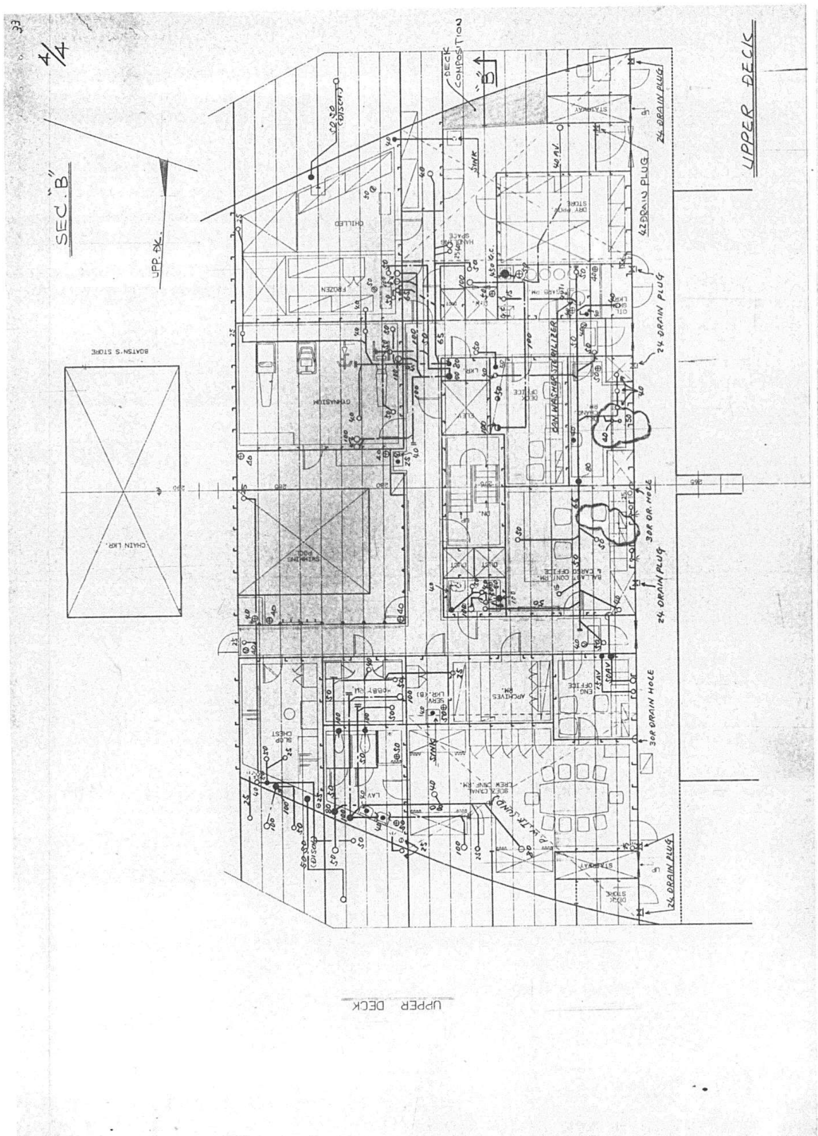
30

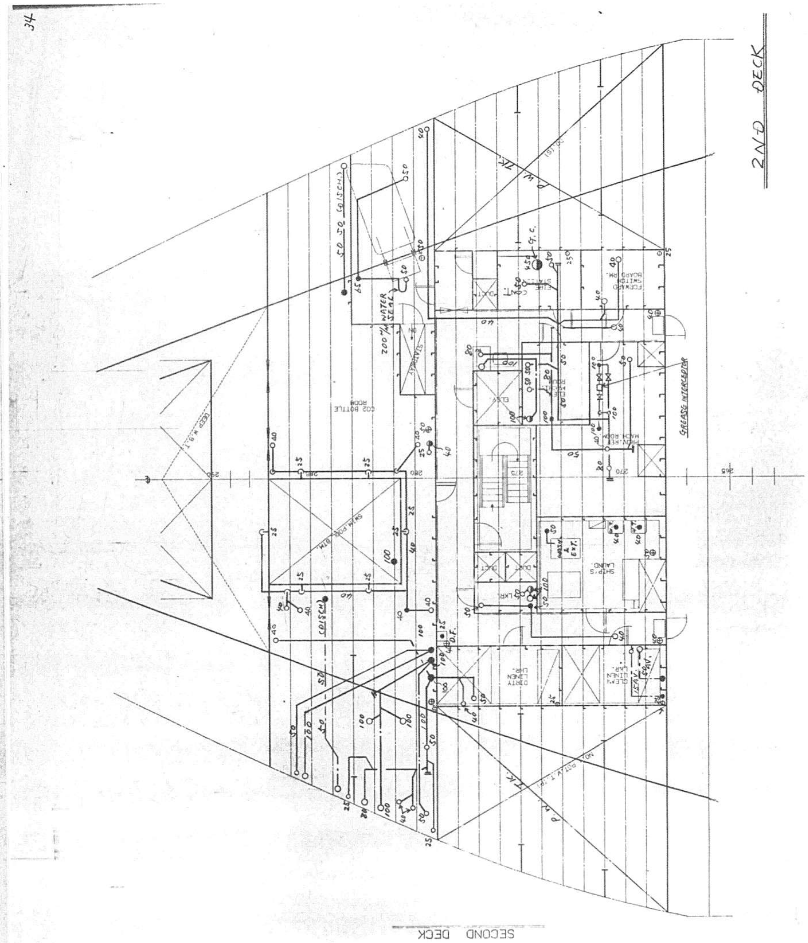


BOAT DECK (03)


CREW DECK (02)

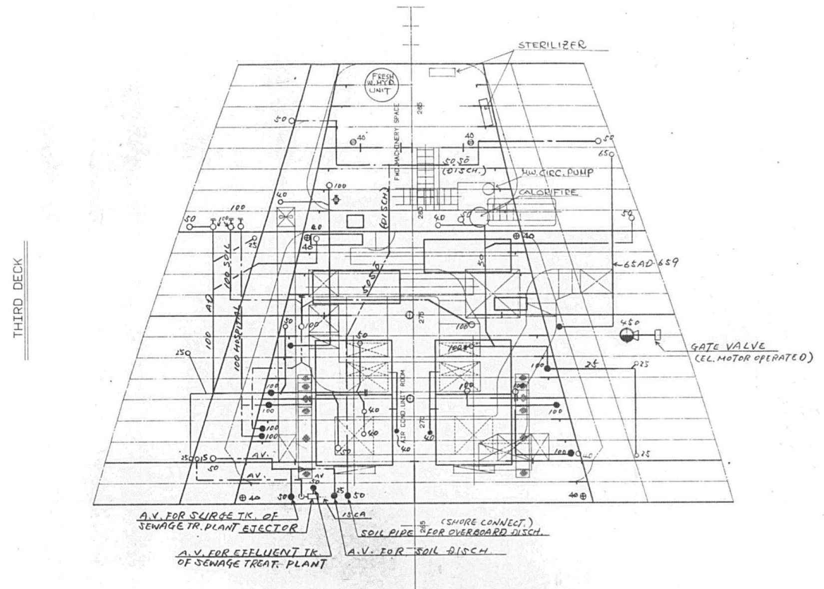

SALOON DECK (01)





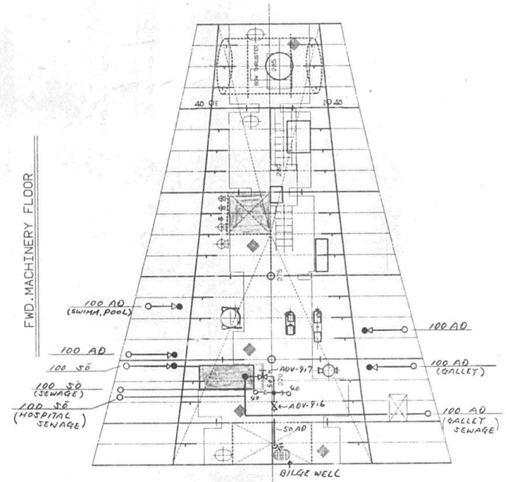
1703

35



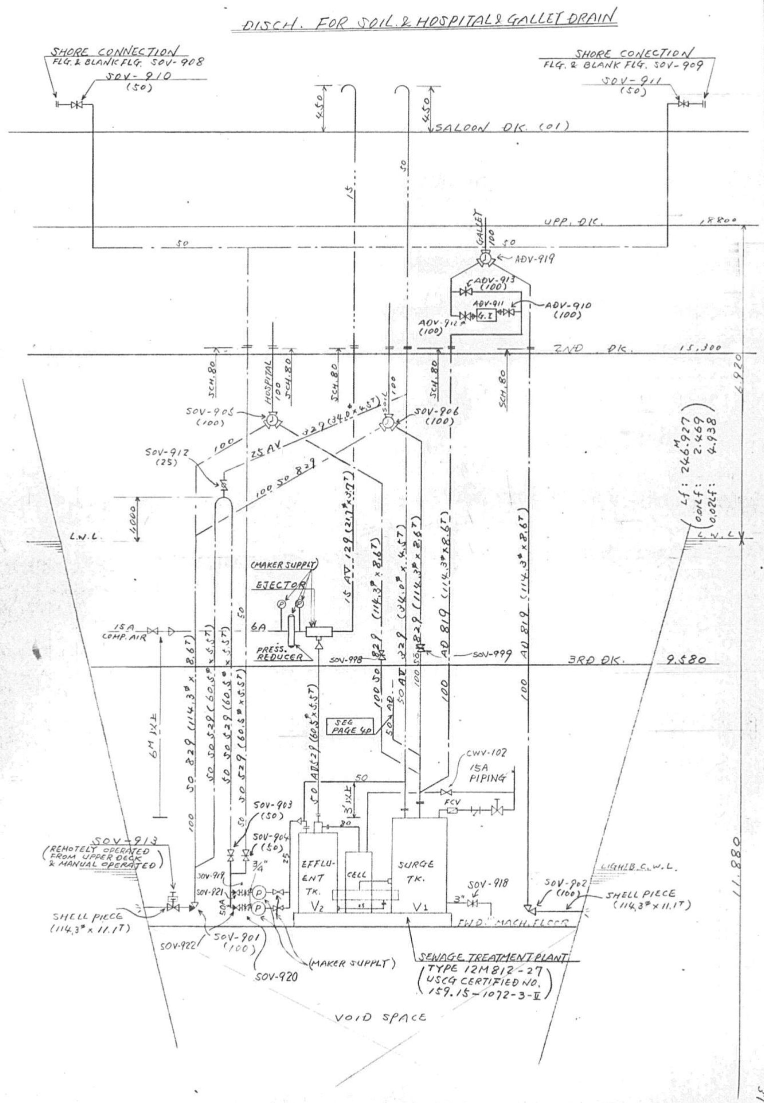
3RD. DECK

36

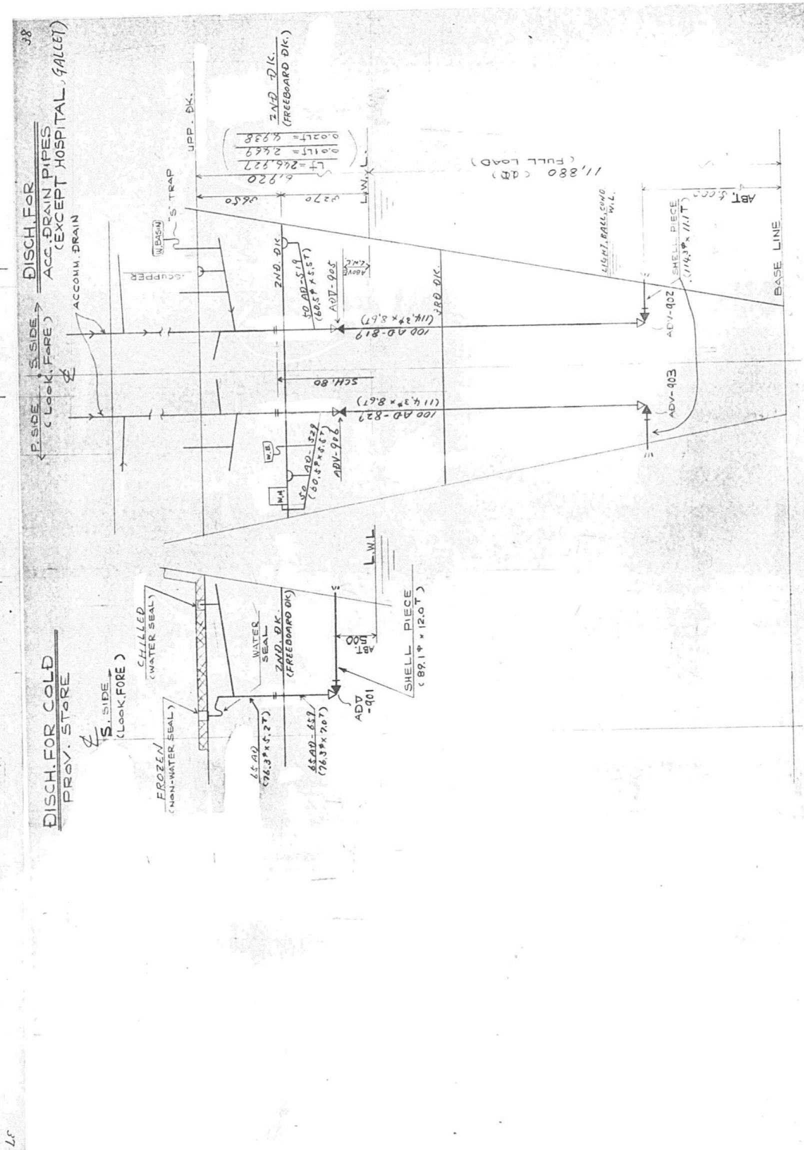


FWD. MACH. FLOOR

1704

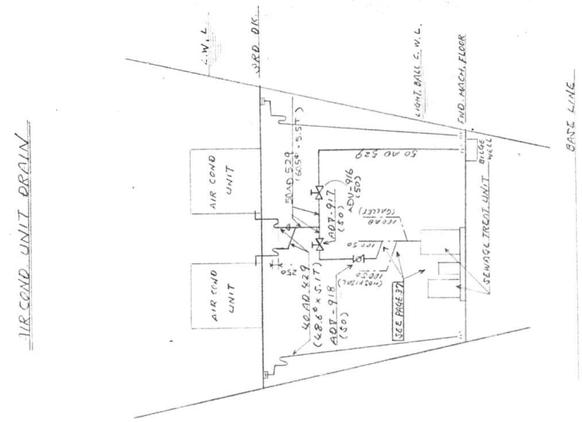


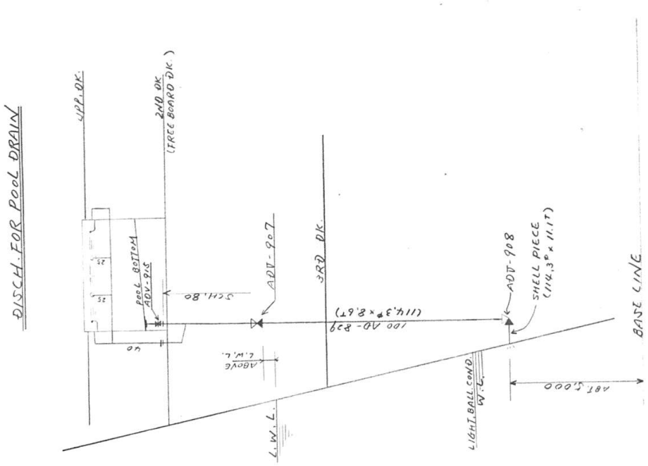
DISCH. FOR SOIL & HOSPITAL & GALLEY DRAIN
SHORE CONNECTION
FLG. & BLANK FLG. SOV-908
SOV-910
(50)
SHORE CONECTION
FLG. & BLANK FLG. SOV-909
SOV-911
(50)
SALOON DK (01)
UPP. DK.
2ND DK.
3RD DK.
L.W.L.
SEWAGE TREATMENT PLANT
TYPE 12M812-27
USCG CERTIFIED NO.
159.15-1072-3-II
EFFLUENT TK.
SURGE TK.
VOID SPACE
SHELL PIECE
FWD. MACH. FLOOR



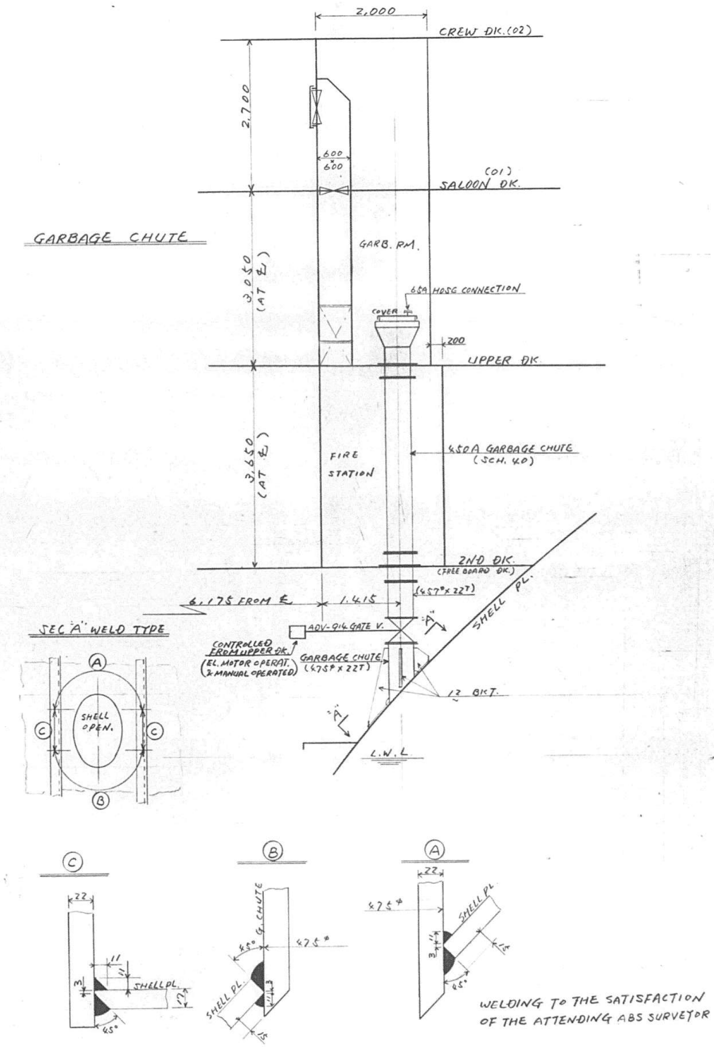
DISCH. FOR ACC. DRAIN PIPES
(EXCEPT HOSPITAL, GALLEY)
DISCH. FOR COLD PROV. STORE
BASE LINE
SHELL PIECE

1705



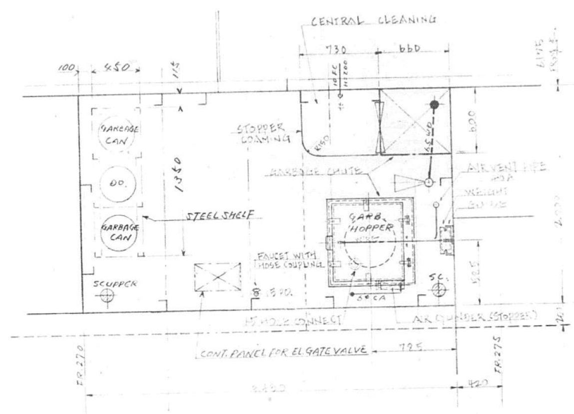


GARBAGE CHUTE



WELDING TO THE SATISFACTION OF THE ATTENDING ABS SURVEYOR

1706



GARBAGE ROOM PLAN

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	19 MAR '85	EFTS/MES-200			10 APRIL '85	T-8-2		
△1	3 MAY '85	EFTS/MES-381			17 MAY '85	T-8-2		
△2	8 AUG '85	EFTS/MES-840			14 OCT '85	T-8-2		
△3	—	—			—	—		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER — SHIP'S NO. — SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC.(PIPING) SEC.CHIEF / ASST. CHIEF / CHARGE / STAFF / DATE (TEL 2240)

甲板排水管系統図
(含む 冷凍コンテナー用ドレン管)

ARRANGEMENT OF EXPOSED DECK SCUPPER PIPES
(INCLUDE. REF. CONT. DRAIN PIPES)

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.
TS1323/24/25 JOBCLASSIF. NO. D.16.06	~	480801	4116601 R

(1/9 SHEETS WITH COVER)

1/19

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN,	JUNE 30 '86
		CHANGED AS FOLLOWS.	
		△1 : SCUPPER PIPES FOR SALOON DECK ENTRANCE WERE PROVIDED INSTEAD OF DRAIN HOLES.	
		MADE APPLICABLE TO S.1324 AND S.1325.	

DWG. NO. 4116601 2/19

GENERAL NOTE

1. THE DRAIN PIPES FOR REF. CONTAINERS IN NO.5 HOLD ARE SHOWN ON THIS DRAWING.
2. ALL PIPES SHALL BE GALVANIZED EXCEPT THOSE IN OIL TANKS.
4. GALVANIZING BEFORE FABRICATION OF WELDED JOINTS MAY BE APPLIED TO FOLLOWING PIPES ONLY.
   a) PIPES FOR EXPOSED UPPER DECK SCUPPER (SEE PAGE 14/19)

   AND ALSO GALVANIZING BEFORE INSTALLATION OF FITTINGS ON BOARD SHALL BE PERMITTED.
   DAMAGED PARTS OF THE ABOVE MENTIONED GALVANIZED PARTS GIVEN BY WELDING ON BOARD SHALL BE TOUCHED UP WITH ZINC-RICH PAINT AFTER SURFACE PREPARATION.

   PIPES WHERE TO BE GALVANIZED, EXCEPT THE ABOVE MENTIONED a) SHALL BE GALVANIZED AFTER FABRICATION OF WELDED JOINTS IN GENERAL.
5. CLEAN OUT PLUGS SHALL NOT BE PROVIDED SINCE DRAIN PIPES AND SCUPPER PIPES HAVE NOT SO MANY BENDS PARTS.

DWG. NO. 4116601 3/19

REFERENCE

NO.	REF. NO. MES	REF. NO. LIKES	DWG. NO.	DWG. NAME
1		480001	4116002	PIPING PRACTICE
2		190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
3		482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
4		482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
5		482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS.
~~6~~		~~482604~~	~~4116007~~	~~SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES~~
7		482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
8		482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
9		482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
10		482608	5131205	GASKET (GENERAL USE)
11		480101	4116201	DIAGRAM OF BILGE, BALL. & F.O. LINES
12		480701	4116501	DIAGRAM OF DRAIN AND SOIL PIPE FOR ACCOMMODATION SPACE
13				
14				
15				
16				
17				
18				
19				
20				

DWG. NO. 4116601 4/19

1708

DWG. NO. 4116601 5/19

FITTING LIST (1/1)

SYMBOL	TYPE	SERVICE	PRESS. RATE	MAX. WORK. PRESS.	WORK. TEMP.	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS SEE PAGE	REMARKS 手配整理No.
	GRATING (FIXED TYPE)	DK. DRAIN	–	–	38°C	STEEL PLATE (SS41) (GALV.)	–	–	125	5	2	SCV-6	7/19	4216697
									100	4	6	[illegible]	7/19	
									80	3	2	SCV-2	8/19	
									65	2½	4	SCV-3		
									50	2	6	SCV-4	7/19	
									40	1½	28	SCV-5		
	GRATING (WITH HINGE)		–	–	38°C	STEEL PLATE (SS41) (GALV.)	–	–	150	6	6	SCV-11	12/19	
									125	5	14	SCV-12	11/19	
	WOODEN PLUG WITH CHAIN		–	–	38°C	WOODEN	–	–	150	6	6	SCV-21	14/19	4216663
									125	5	14	SCV-22	13/19	
	DRAIN PLUG WITH CHAIN		–	–	38°C	STEEL (SS41) (EQUIVALENT TO ASTM A36) BRASS (HS102 HBsC2) (EQUIVALENT TO ASTM B584)	–	–	M24	–	3	SCV-31	13/19	4216697
	SCUPPER BOX		–	–	38°C	STEEL PLATE (SS41) (GALV.)	–	–	65	2½	4	SCV-41	10/19	
									50	2	2	SCV-42	9/19	
									40	1½	6	SCV-43	10/19	

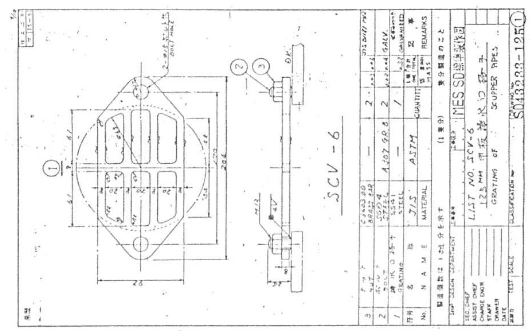
DWG. NO. 4116601 6/19

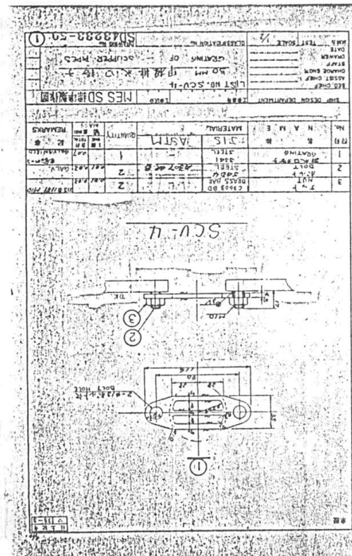
手配 STEEL PIPE ···· 手配No. 4216691
STEEL FLANGE ··· 手配No. 4216660
BUT WELD. JOINT ··· 手配No. 4216662

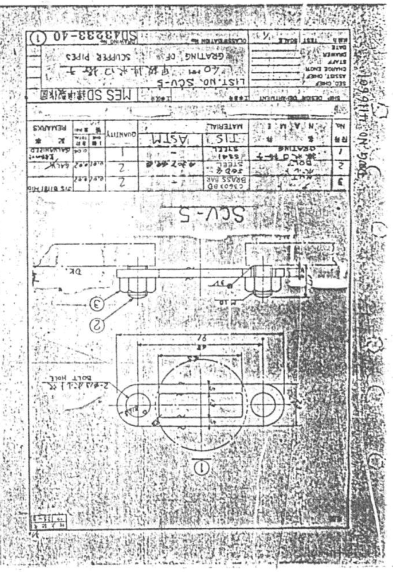
PIPING LIST (1/1)

SYSTEM (SERVICE)	MAX. WORK. PRESS.	WORK. TEMP.	HYD. TEST PRESS.	PIPE MATERIAL	PIPE LIST. NO.	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS. STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
SCUPPER PIPES (IN UNDER DK. PASSAGE, MACHINERY SP. & IN HOLD) (GZ, GZAZ)	–	38°C	–	CARBON STEEL PIPE JIS G3455 STS38-S	SC-401	150	6	165.2	18.2	160	10 kg/cm²	BUTT WELDED	JIS G3456 STPT42 [EQUIVALENT TO ASTM A106 Gr.B]	II	II
					SC-420	125	5	139.8	15.9	160		OR	OR		
					SC-440	100	4	114.3	13.5	160		STEEL SLIP-ON WELDED FLANGE (JIS B 2222)	ROLLED STEEL PL. JIS G3101 SS41 [EQUIVALENT TO ASTM A36]		
				[EQUIVALENT TO ASTM A106 Gr.A]	SC-480	40	1½	48.6	7.1	160 ∆					
DO. (IN W.B. TK.) (GZ, GZTE)					SC-220	125	5	139.8	15.9	160					
DO. (IN ACCOMM. SP.) (GZ, GZ)				GALVANIZED	SC-320	125	5	139.8	15.9	160					
					SC-380	40	1½	48.6	7.1	160 ∆					
DO. (IN F.O. TK.) (GZ, -)				DO. (OUT SIDE ··· NOT GALV.)	SC-620	125	5	139.8	15.9	160		[SEE REF.4]			
DO. (WEATHER PART) (GZ, GZAZ)				CARBON STEEL PIPE	SC-40	100	4	114.3	6.0	40		WELDED SLEEVE	CARBON STEEL PIPE JIS G3455 STS38-S [EQUIVALENT TO ASTM A106 Gr.A]		
				JIS G3454 STPG38-E	SC-60	80	3	89.1	5.5	40					
					SC-80	65	2½	76.3	5.2	40					
				[EQUIVALENT TO ASTM A53 Gr.A]	SC-100	50	2	60.5	3.9	40		OR	OR		
					SC-120	40	1½	48.6	3.7	40		STEEL SLIP-ON WELDED FLANGE (JIS B 2222)	ROLLED STEEL PL. JIS G3101 SS41 [EQUIVALENT TO ASTM A36]		
				GALVANIZED	–										
DO. (IN ACCOMM. SPACE) (GZ, GZ)												[SEE REF.4]			
DO. (IN MACHINERY SPACE) (GZ, GZAZ)					SC-500	50	2	60.5	3.9	40					
DRAIN PIPES FOR REF. CONTAINER (IN NO.5 HOLD) (GZ, GZAZ)					SC-580	80	3	89.1	5.5	40					
					SC-550	50	2	60.5	3.9	40					
					SC-525	25	1	34.0	3.4	40					

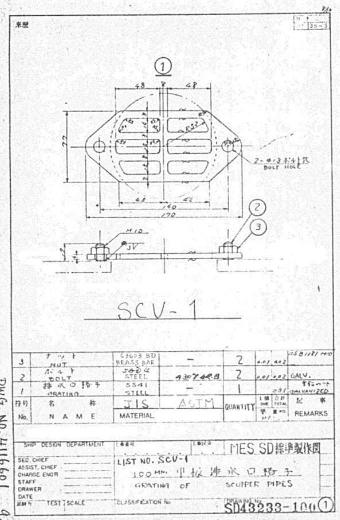
DWG. No. 4116601 7/19

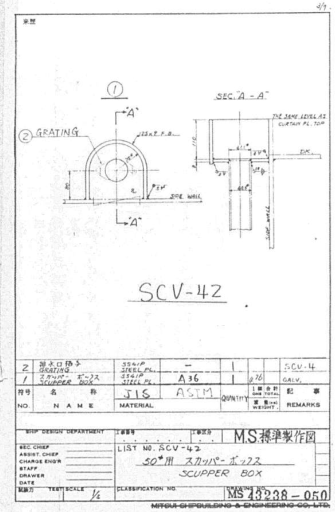


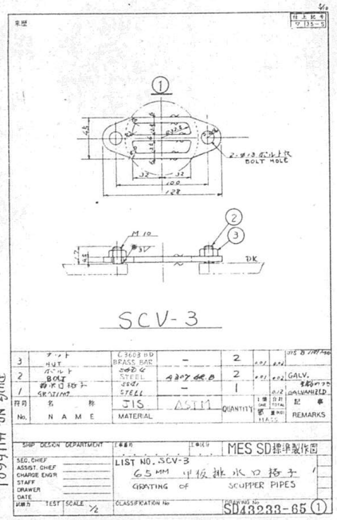


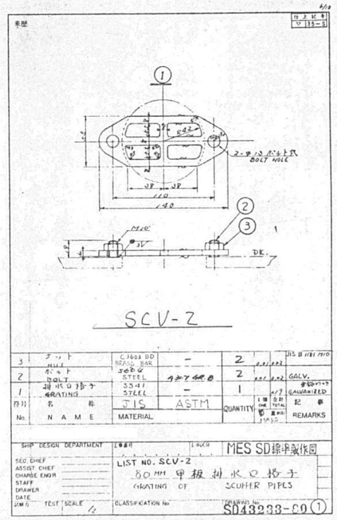


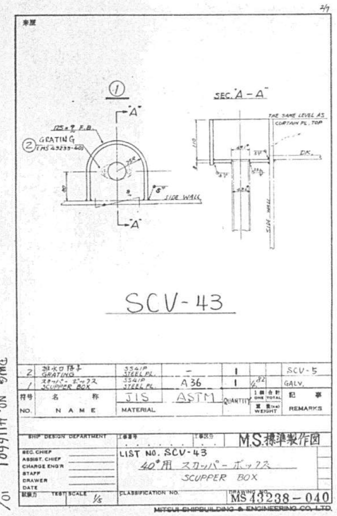
1709

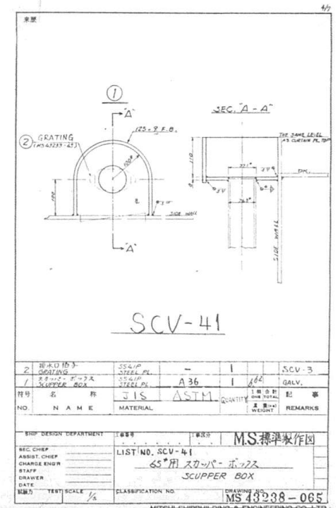

SCV-1
MES SD 標準製作図
LIST NO. SCV-1
GRATING OF SCUPPER PIPES
SD43233-100
DWG. NO. 4116601 9/4


GRATING
SEC. "A - A"
SCV-42
M.S 標準製作図
LIST NO. SCV-42
SCUPPER BOX
MS 43238-050
MITSUI SHIPBUILDING & ENGINEERING CO., LTD.

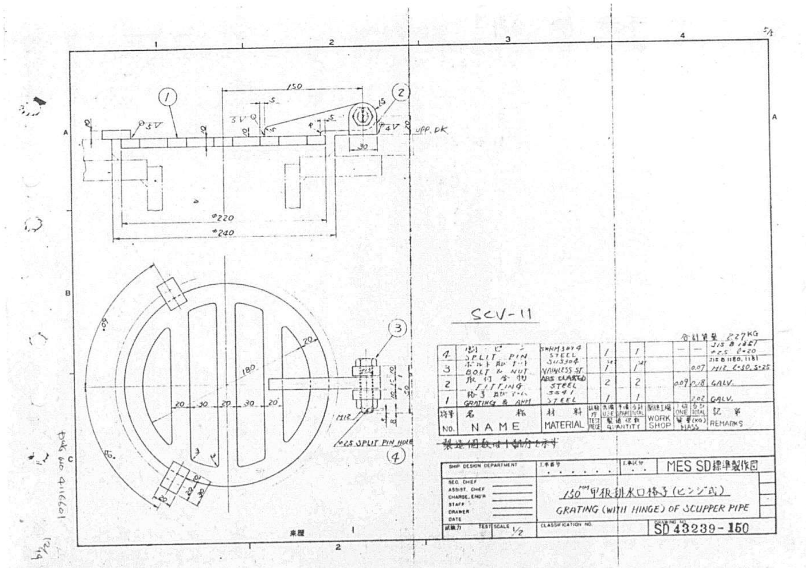

SCV-3
MES SD 標準製作図
LIST NO. SCV-3
GRATING OF SCUPPER PIPES
SD43233-65
DWG. NO. 4116601 8/4

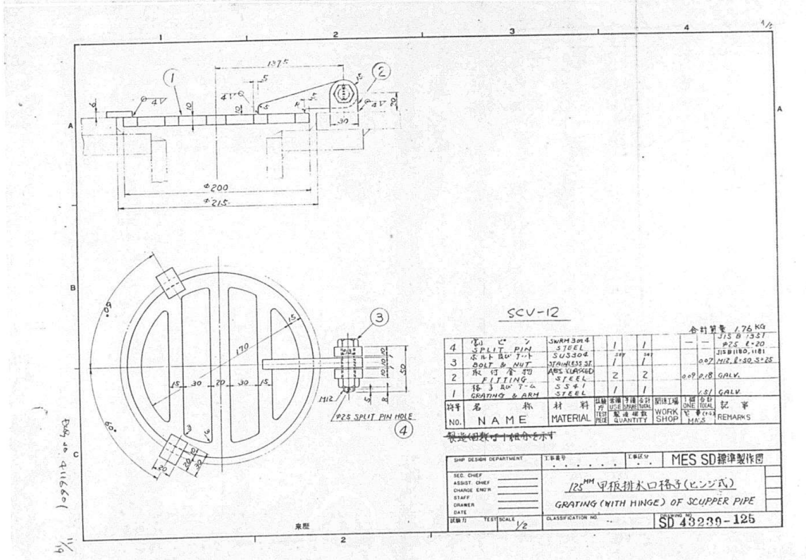

SCV-2
MES SD 標準製作図
LIST NO. SCV-2
GRATING OF SCUPPER PIPES
SD43233-80


GRATING
SEC. "A - A"
SCV-43
M.S 標準製作図
LIST NO. SCV-43
SCUPPER BOX
MS 43238-040
DWG. NO. 4116601 10/4
MITSUI SHIPBUILDING & ENGINEERING CO., LTD.

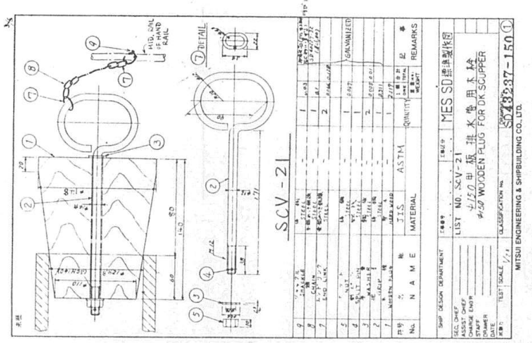

GRATING
SEC. "A - A"
SCV-41
M.S 標準製作図
LIST NO. SCV-41
SCUPPER BOX
MS 43238-065
MITSUI SHIPBUILDING & ENGINEERING CO., LTD.

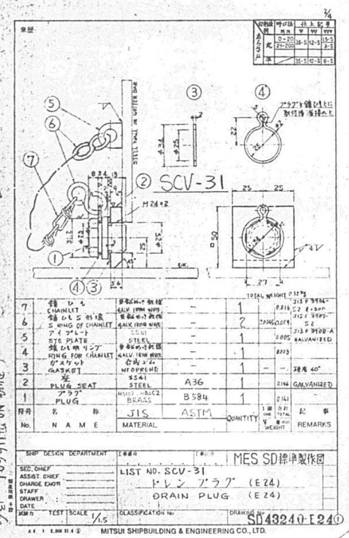
1710

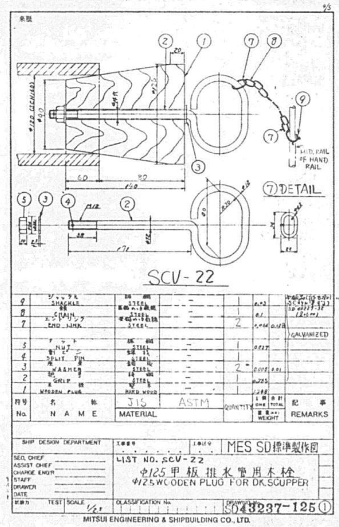

SCV-11
合計質量 2.27KG
4 割ピン SPLIT PIN SWRM3or4 STEEL 1 1 — — JIS B 1351 φ2.5 ℓ=20
3 ボルト及びナット BOLT & NUT SUS304 STAINLESS ST. 1 SET 1 SET 0.07 JIS B 1180, 1181 M12 ℓ=50, S=25
2 取付金物 FITTING ABS CLASSED STEEL 2 2 0.09 0.18 GALV.
1 格子及びアーム GRATING & ARM SS41 STEEL 1 1 2.02 GALV.
符号 NO. 名称 NAME 材料 MATERIAL 試験片 TEST PIECE 製造個数 QUANTITY 常備 USE 予備 SPARE 合計 TOTAL 関係工場 WORK SHOP 質量(KG) MASS 1個 ONE 合計 TOTAL 記事 REMARKS
SHIP DESIGN DEPARTMENT
SEC. CHIEF
ASSIST. CHIEF
CHARGE ENG'R
STAFF
DRAWER
DATE
MES SD標準製作図
150MM 甲板排水口格子(ヒンジ式)
GRATING (WITH HINGE) OF SCUPPER PIPE
SCALE 1/2
CLASSIFICATION NO.
DRAWING NO. SD 43239-150

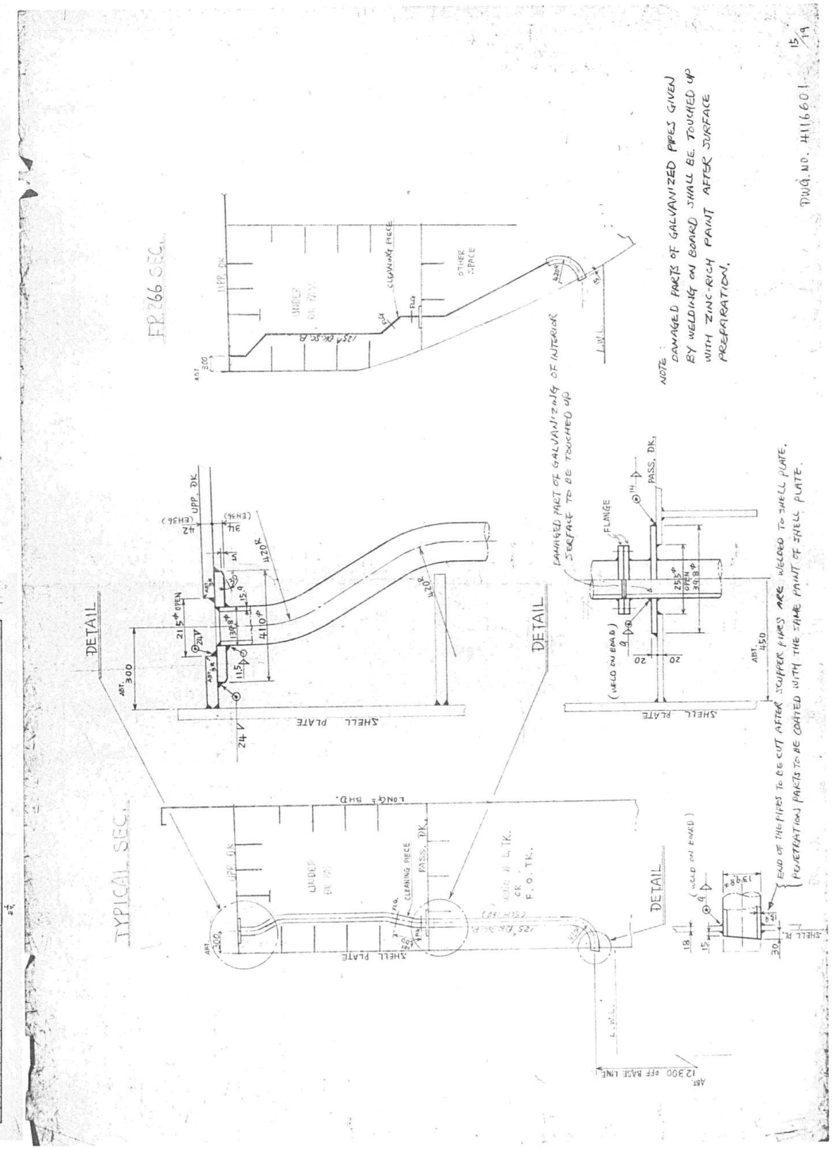

SCV-12
合計質量 1.76KG
4 割ピン SPLIT PIN SWRM3or4 STEEL 1 1 — — JIS B 1351 φ2.5 ℓ=20
3 ボルト及びナット BOLT & NUT SUS304 STAINLESS ST. 1 SET 1 SET 0.07 JIS B 1180, 1181 M12 ℓ=50, S=25
2 取付金物 FITTING ABS CLASSED STEEL 2 2 0.09 0.18 GALV.
1 格子及びアーム GRATING & ARM SS41 STEEL 1 1 1.51 GALV.
符号 NO. 名称 NAME 材料 MATERIAL 試験片 TEST PIECE 製造個数 QUANTITY 常備 USE 予備 SPARE 合計 TOTAL 関係工場 WORK SHOP 質量(KG) MASS 1個 ONE 合計 TOTAL 記事 REMARKS
SHIP DESIGN DEPARTMENT
SEC. CHIEF
ASSIST. CHIEF
CHARGE ENG'R
STAFF
DRAWER
DATE
MES SD標準製作図
125MM 甲板排水口格子(ヒンジ式)
GRATING (WITH HINGE) OF SCUPPER PIPE
SCALE 1/2
CLASSIFICATION NO.
DRAWING NO. SD 43239-125

1711


SCV-21
LIST NO. SCV-21
φ150 WOODEN PLUG FOR DK.SCUPPER
SD43237-150
MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
DWG. NO. 411660I 14/19

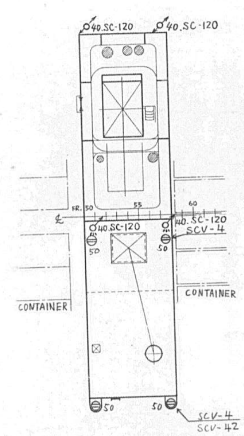

SCV-31
MES SD標準製作図
LIST NO. SCV-31
ドレンプラグ (E24)
DRAIN PLUG (E24)
SD43240-E24
MITSUI SHIPBUILDING & ENGINEERING CO., LTD.


SCV-22
MES SD標準製作図
LIST NO. SCV-22
φ125甲板排水管用木栓
φ125 WOODEN PLUG FOR DK.SCUPPER
SD43237-125
MITSUI ENGINEERING & SHIPBUILDING CO., LTD.

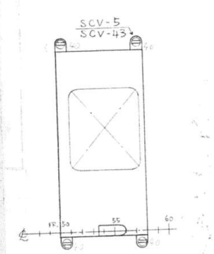

DWG. NO. 411660I 15/19
FR266 SEC.
TYPICAL SEC.
DETAIL
SHELL PLATE
NOTE: DAMAGED PARTS OF GALVANIZED PIPES GIVEN BY WELDING ON BOARD SHALL BE TOUCHED UP WITH ZINC-RICH PAINT AFTER SURFACE PREPARATION.

1712

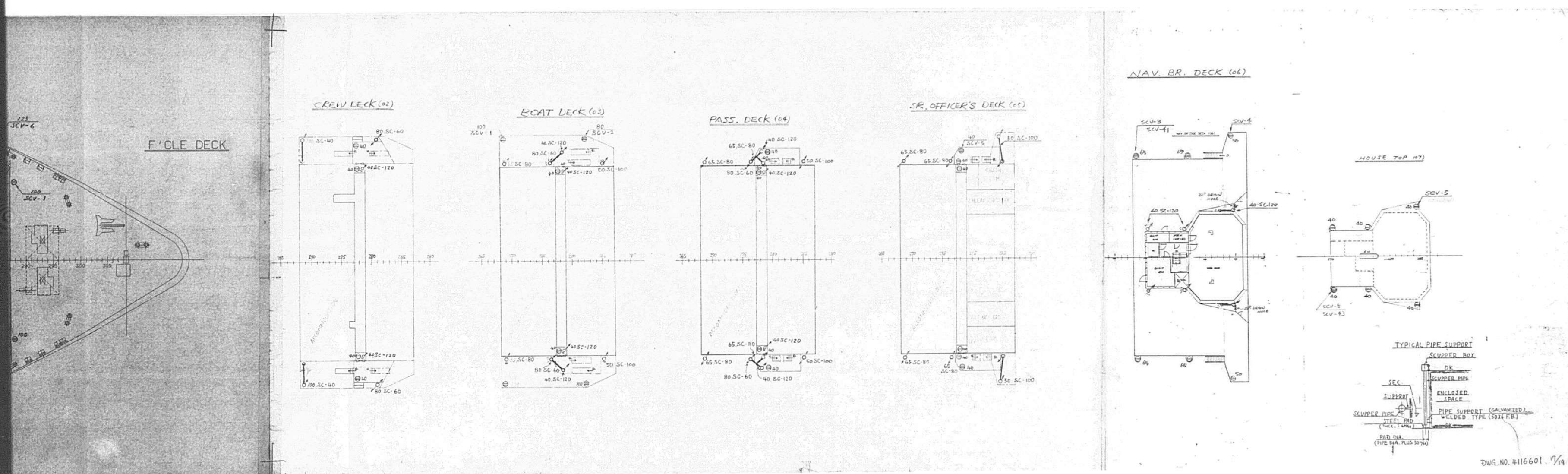
4.4M LEVEL



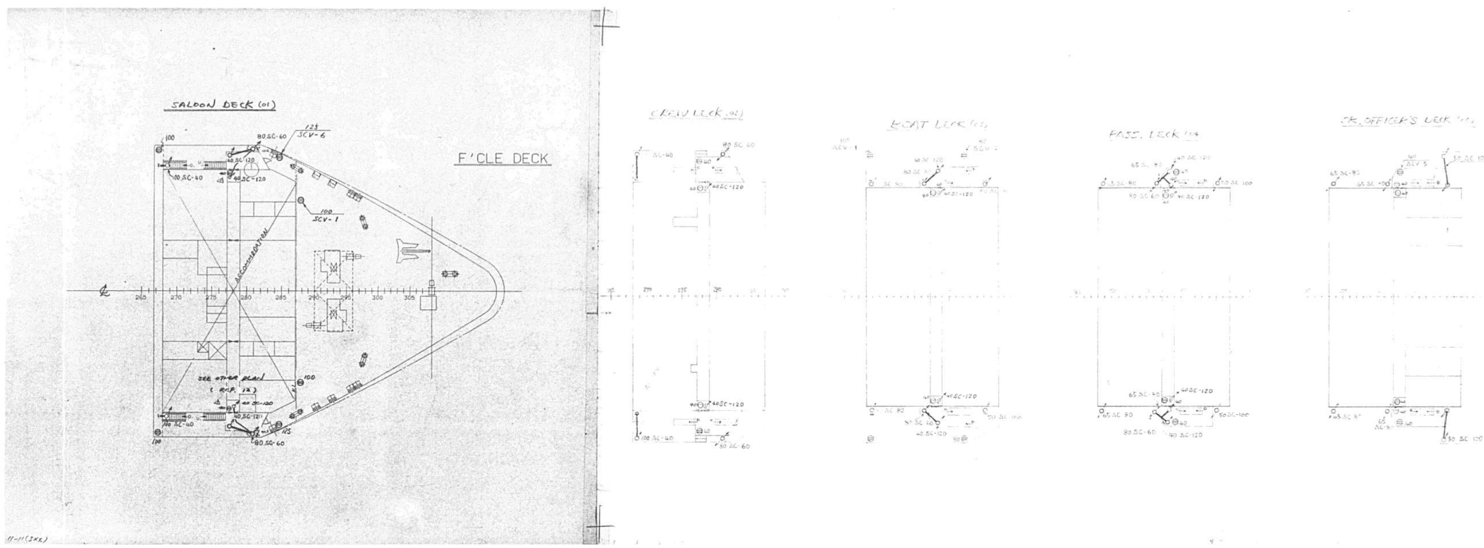
ENG. CASING TOP



DWG NO. 411-6601 16/19

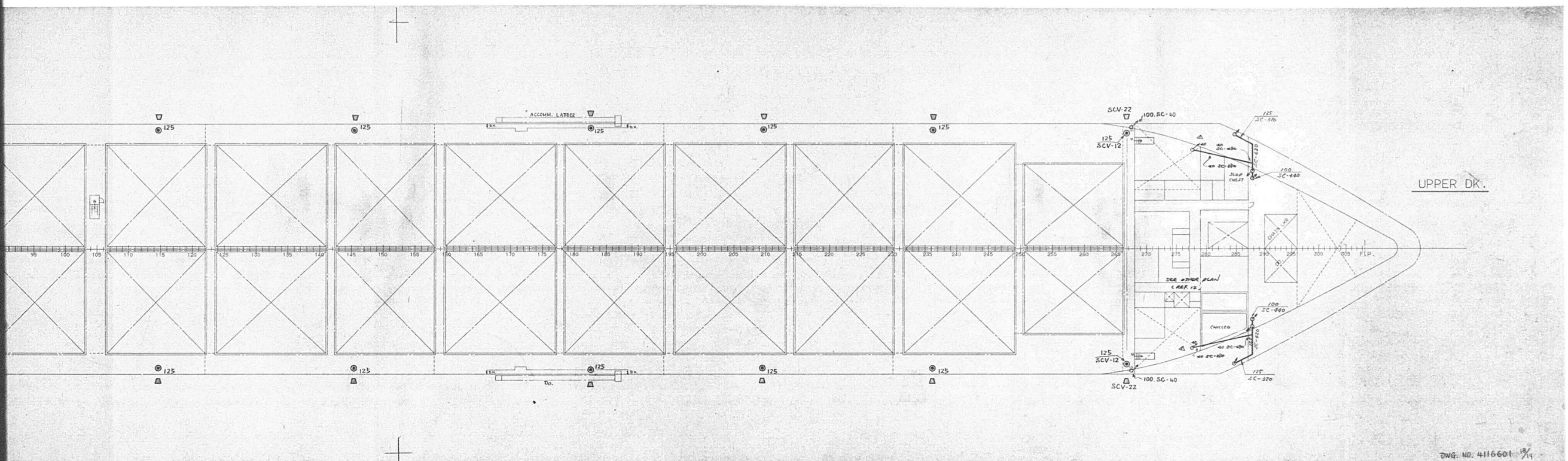

F'CLE DECK
CREW DECK (02)
BOAT DECK (03)
PASS. DECK (04)
SR. OFFICER'S DECK (05)
NAV. BR. DECK (06)
HOUSE TOP (07)
TYPICAL PIPE SUPPORT
SCUPPER BOX
DWG. NO. 4116601

1714

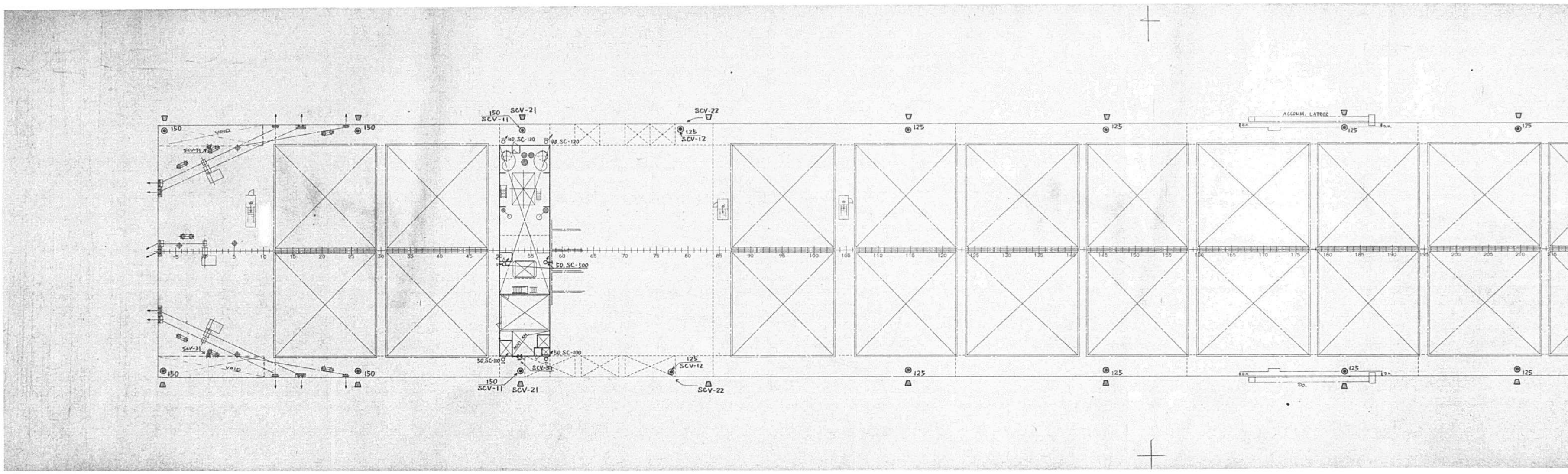


SALOON DECK (01)
F'CLE DECK
CREW DECK (02)
BOAT DECK (03)
PASS. DECK (04)
SR. OFFICER'S DECK

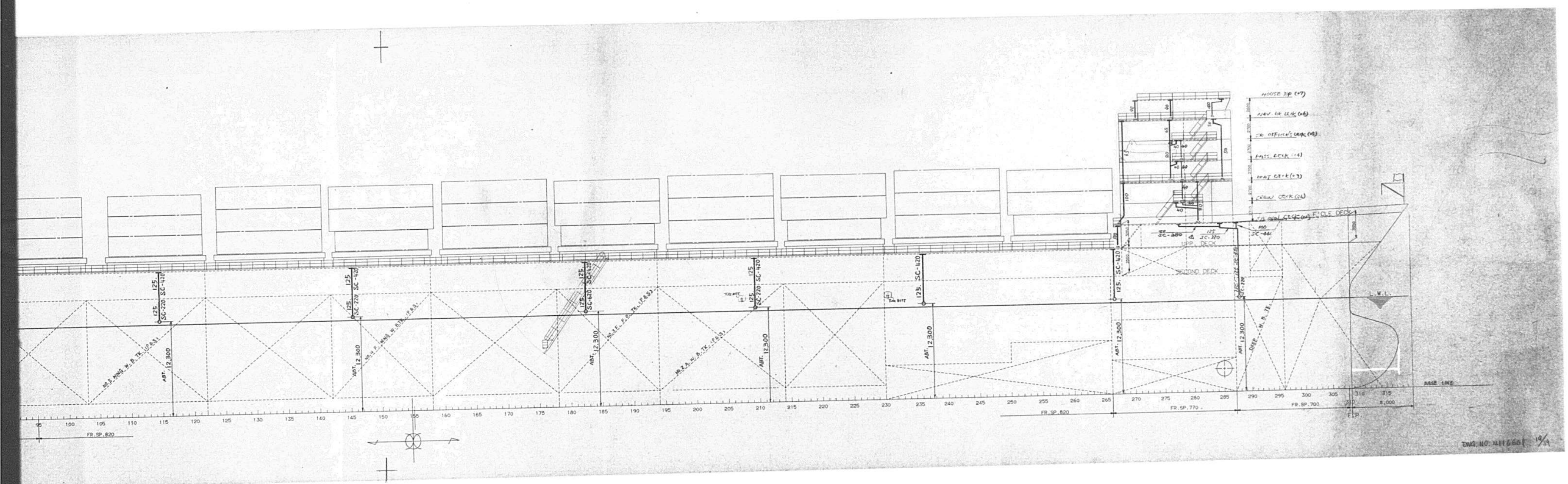
2/2 1715



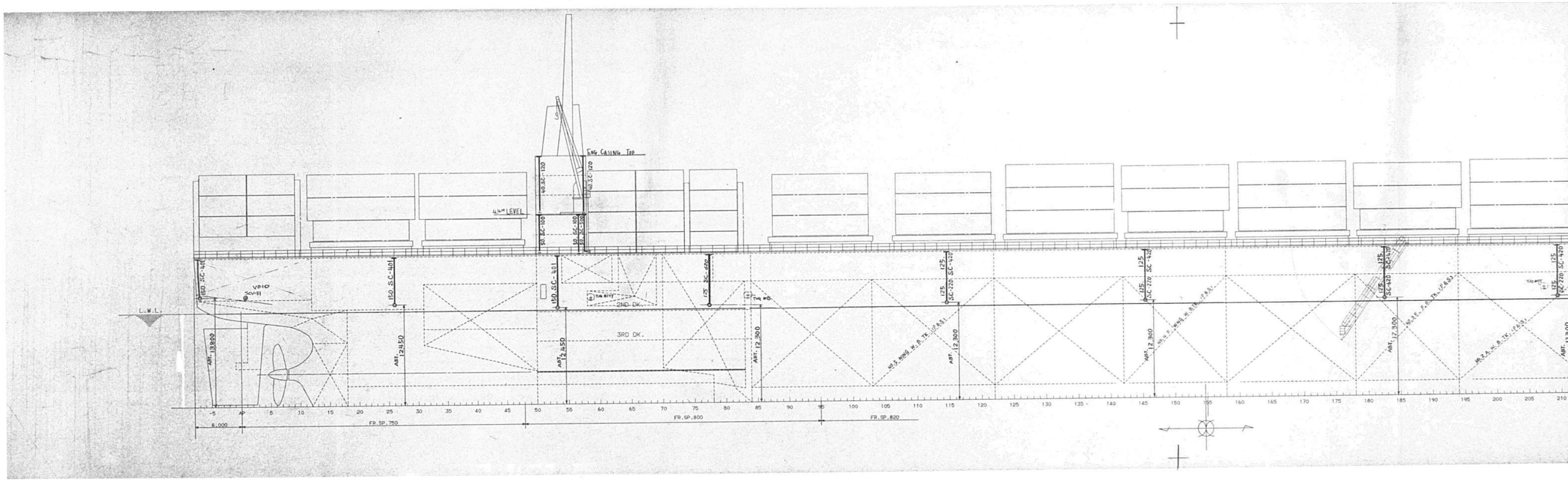
1/2 1716



2/2 1717



1718



2/2 1719

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAR. 11 '85	OFTS/NAB/33	APR. 17 '85	7-8-2		
REV. 01	AUG. 18 '85	TAM/35 TAM/44	OCT. 25 '85	7-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NAME: **TILLIE LYKES**

OUTFIT DESIGN SECT (PIPING)

機関部

蒸気ドレン管系図

STEAM DRAIN PIPING DIAGRAM
IN ENGINE ROOM

DATE 7 NOV 1986

LYKES REF. NO. 480802 — MITSUI DRAWING NO. 5131008 — REV.

(13 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.No.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.No.1324 AND S.No.1325.	JUN. 26 '86

DWG.NO. 5131008 1

GENERAL NOTE

DWG.NO. 5131008 2

REFERENCE

NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480001	4116002	PIPING PRACTICE
	190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
	482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS
	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
	482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
	482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
	482608	5131205	GASKET (GENERAL USE)
	482604	5233111	CAST STEEL VALVES
	482606	5233112	FORGED STEEL VALVES
	482607	5233114	BRONZE VALVES

DWG.NO. 5131008 3

1720

REFERENCE			
NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480201	S131001	FEED & CONDENSATE PIPING DIAGRAM IN ENG. RM
	481001	S131002	STEAM AND EXHAUST PIPING DIAGRAM IN ENG. RM
	~~480802~~	~~S131008~~	~~STEAM DRAIN PIPING DIAGRAM IN ENG. RM~~
	481401	S131009	L.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481402	S131012	L.O. TRANSFER & PURIFICATION PIPING DIAGRAM IN ENG. RM
	481501	S131013	F.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481509	S131014	F.O. TRANSFER PIPING DIAGRAM IN ENG. RM
	481502	S131015	F.O. PURIFICATION PIPING DIAGRAM IN ENG. RM
	480403	S131016	COOLING F.W. PIPING DIAGRAM IN ENG. RM
	480501	S131018	COOLING S.W. & S.W. SERVICE PIPING DIAGRAM IN ENG. RM
	~~480301~~	~~S131019~~	FIRE G.S. & BALLAST PIPING ~~DIAGRAM IN ENG. RM~~
	480102	S131020	BILGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENG. RM
	480401	S131023	F.W. SERVICE PIPING DIAGRAM IN ENG. RM
	481802	S131024	COMPRESSED AIR PIPING DIAGRAM IN ENG. RM
	481803	S131025	CONTROL AIR PIPING DIAGRAM IN ENG. RM
	~~481806~~	~~S131026~~	MAIN ENGINE REMOTE CONTROL AIR PIPING DIAGRAM IN ENG. RM
	~~520001~~	~~S131030~~	~~EXHAUST GAS PIPING DIAGRAM IN ENG. RM~~
	481301	4116801	DIAGRAM OF HEATING COILS FOR FUEL OIL TANKS
	482413	5233212	STEAM TRAP

S131008

CODED GROUP SYSTEM OF PIPING DIAGRAM

区分 (DIVISION) / 管系 (SYSTEM)	記号および番号 (DIVISION OF SYMBOL NUMBER) 管 (PIPE)	弁.コック.こし器 (VALVE, COCK)
蒸気ドレン(ボイラー圧)管系 BOILER PRESS. STEAM DRAIN	1D-1 ~ 999	1DV-1 ~ 999
蒸気ドレン(減高圧)管系 HIGH REDUCED STEAM DRAIN	2D-1 ~ 999	2DV-1 ~ 999
蒸気ドレン(減低圧)管系 LOW REDUCED STEAM DRAIN	3D-1 ~ 999	3DV-1 ~ 999
過熱蒸気ドレン管系 SUPERHEATED STEAM DRAIN	4D-1 ~ 999	4DV-1 ~ 999
その他ドレン管系 ALL OTHER DRAIN	5D-1 ~ 999	5DV-1 ~ 999

S131008

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.

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SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT
		GATE (SLUICE) VALVE	:BUTT OR SOCKET WELDING ENDED
		BUTTERFLY VALVE	:UNION ENDED
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	:LOCKED CLOSE
		SCREW DOWN CHECK VALVE	:LOCKED OPEN
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE;
		PRESS. REDUCING VALVE DIRECT OPERATING TYPE	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
COCK		TWO-WAY COCK	:LOCKED CLOSE
		THREE-WAY COCK	:LOCKED OPEN
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER
		PISTON TYPE (ON-OFF CONTROL)	:WITH POSITIONER
		PISTON TYPE (OPEN DEGREE CONTROL)	:WITH MANUAL HANDLE
		ELECTRIC MOTOR TYPE	
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS.-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	:WITH STOP VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	:WITHOUT VALVE
		FLAT GLASS LEVEL GAUGE	:WITH SELF CLOSING VALVE
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE:
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	TANK
	L	LEVEL INDICATOR	
	VS	VISCOSITY INDICATOR	
	P	PRESSURE GAUGE	
	C	COMPOUND GAUGE	
	V	VACUUM GAUGE	
		DIFF. PRESS. GAUGE	
	T	THERMOMETER	
	T	REMOTE THERMOMETER	
	F	FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETECTOR		PRESSURE SWITCH	
		TEMPERATURE SWITCH	
		LEVEL (FLOAT) SWITCH	
		FLOW SWITCH	
		SALINITY CELL	
		ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
		MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

KIND	SYMBOL	NAME	REMARK
SAMPLE		---SYMBOL ---INSTRUMENT NO.	
INDICATOR	PI	PRESSURE INDICATOR	
	VI	VACUUM INDICATOR	
	CI	COMPOUND INDICATOR	
		DIFF. PRESS. INDICATOR	
	TI	TEMPERATURE INDICATOR	
	LI	LEVEL INDICATOR	
		VISCOSITY INDICATOR	
	DI	DENSITY INDICATOR	
		SALINITY INDICATOR	
	FI	FLOW INDICATOR	
	XI	OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL	PC	PRESSURE CONTROL	
	TC	TEMPERATURE CONTROL	
	LC	LEVEL CONTROL	
		VISCOSITY CONTROL	
	AC	AUTOMATIC CONTROL	
		EMER. SHUT DOWN	
		EMER. SLOW DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		AUTOMATIC START	
		AUTOMATIC STOP	
		AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM		HIGH PRESSURE ALARM	
		LOW PRESSURE ALARM	
		HIGH DIFF. PRESS. ALARM	
		HIGH TEMPERATURE ALARM	
		LOW TEMPERATURE ALARM	
		TEMP. DEVIATION HIGH ALARM	
		HIGH LEVEL ALARM	
		LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		HIGH VISCOSITY ALARM	
		LOW VISCOSITY ALARM	
		HIGH DENSITY ALARM	
		HIGH SALINITY ALARM	
		OVER FLOW ALARM	
		NON FLOW ALARM	
	XA	GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131008

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
SUPERHEATED STEAM & IT'S DRAIN LINE (~~4S-1~10~~ 4D-1~20)	200	8	216.3	8.2	SEAMLESS CARBON STEEL PIPE ABS-Gr4 SCH.40 (EQUIVALENT TO ASTM A106 Gr A-S)	JIS 30K (428psi)	STEEL WELDED FLANGE WITH HUB FORGED STEEL PLATE ASTM A105 (3" & OVER)	JIS 30K (428psi)	CAST STEEL FLANGED SC 46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WC A or WC B)	DISC & SEAT: STAINLESS STEEL SCS13 JIS G 5121 (EQUIVALENT TO ASTM A351 CF-8) STEM: STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 30K (428psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	265°C (509°F)	12.5K (178psi)
	150	6	165.2	7.1										
	125	5	139.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7										
	32	1¼	42.7	3.6			STEEL SOCKET WELDED FLANGE WITHOUT HUB FORGED STEEL PLATE ASTM A105 (2½"; ½~2")							
	25	1	34.0	3.4 (Sch.40)				JIS 40K (568psi)	FORGED STEEL FLANGED ASTM A105	DISC & STEM STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)				
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	17.3	3.2 (Sch.80)		JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 40K (568psi)	FORGED STEEL SCREWED ASTM A105	DISC & STEM: STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)		
	6	¼	10.5	2.4										

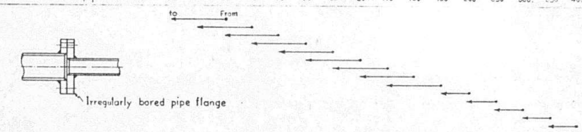
5131008

Reducing method of pipe diameter

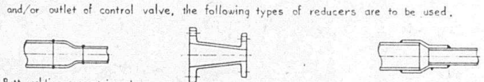
In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the difference of pipe size is within the following limits. → Irregulaly bored pipe flanges shall only be used for vent piping, air piping, and scupper pipe line.

Nominal size of pipes in mm. 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400



2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.



Butt welding concentric reducer. Flange ended reducer Braising reducer

5131008

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131008

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
BOILER PRESSURE STEAM & IT'S DRAIN LINE (~~1S-1~40~~ 1D-1~50)	200	8	216.3	8.2	SEAMLESS CARBON STEEL PIPE ABS-Gr4 SCH.40 (EQUIVALENT TO ASTM A106 Gr A-S)	JIS 20K (285psi)	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL PLATE ASTM A105 (2½" & OVER)	JIS 20K (285psi)	CAST STEEL FLANGED SC 46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WC A or WC B)	DISC & SEAT: STAINLESS STEEL SCS13 JIS G 5121 (EQUIVALENT TO ASTM A351 CF-8) STEM: STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 20K (285psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	193°C (380°F)	12.5K (178psi)
	150	6	165.2	7.1										
	125	5	139.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7										
	32	1¼	42.7	3.6			STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL PLATE ASTM A105							
	25	1	34.0	3.4 (Sch.40)					FORGED STEEL FLANGED ASTM A105	DISC & STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)				
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	17.3	3.2 (Sch.80)		JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 20K (285psi)	FORGED STEEL SCREWED ASTM A105	DISC & STEM: STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)		
	6	¼	10.5	2.4										

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131008

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
5.7K & 3K STEAM IT'S DRAIN LINE (2S-1~60 2D-1~50 3S-1~80 3D-1~50)	200	8	216.3	8.2	WELDED CARBON STEEL PIPE STPG 38E Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 Gr A)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)	JIS 10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WC A or WC B)	DISC & SEAT: SUS FACED ON CAST STEEL OR STAINLESS STEEL SCS13 JIS G 5121 (EQUIV. TO ASTM A351 CF8) STEM: STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	183~138°C (361~280°F)	10~2.5K (143~36 psi)
	150	6	165.2	7.1										
	125	5	139.8	6.6										
STEAM TRAP OUTLET LINE (5D-1~150)	100	4	114.3	6.0									150°C (302°F)	1K (14psi)
	80	3	87.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC: BC6 (ASTM B62) STEM: SUS 304 (ASTM A276 TP304)				
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
ATMOS OPEN DRAIN (6D-1~50)	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-O JIS H 3300 (EQUIVALENT TO ASTM B88 C12200)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285psi)	CAST BRONZE FLARED BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC & STEM STAINLESS ST. SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	50°C (122°F)	0K
	6	¼	8.0	1.2										

5131008

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SLEEVE JOINT

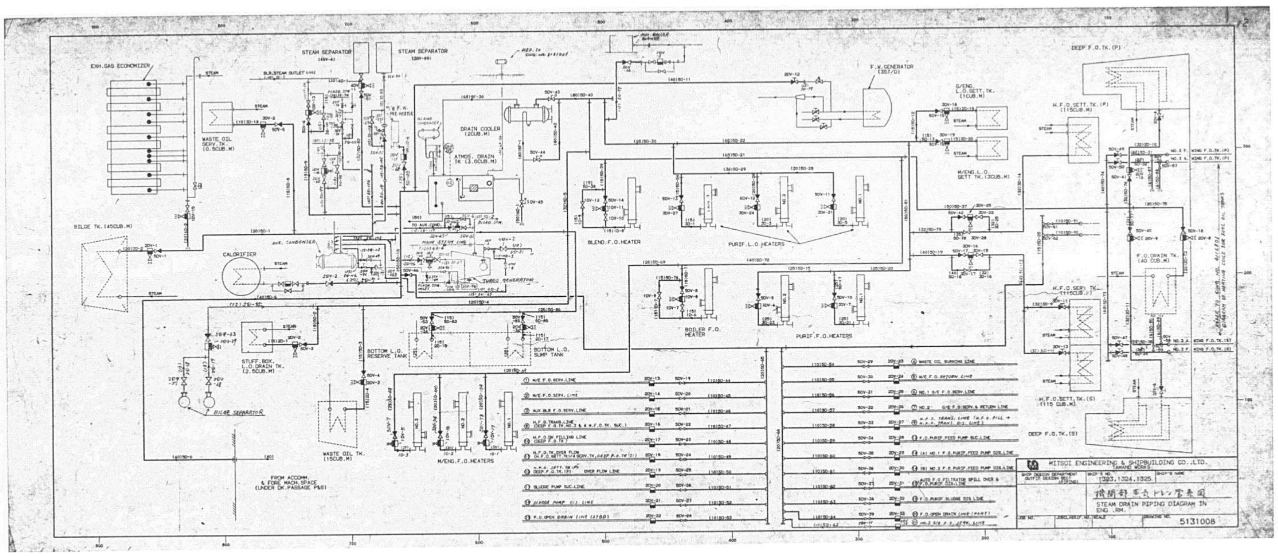
According to the yard's standard practice,
Welding sleeve joints may be used with the limitation as mentioned hereafter.

1 Piping system to be applied

~~Exhaust steam line~~
Steam drain line (5D)
Exhaust gas line
~~Condensate water line~~

All air vent line
All open ended drain line
~~Apen bilge scupper line~~

2 Nominal diameter of the pipe
15 mm and over


MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT OUTFIT DESIGN SECT (PIPING)
SHIP'S NO. 1323,1324,1325
機関部蒸気ドレン管系図
STEAM DRAIN PIPING DIAGRAM IN ENG .RM.
DRAWING NO. 5131008
EXH.GAS ECONOMIZER
STEAM SEPARATOR
DRAIN COOLER (2CUB.M)
F.W.GENERATOR
BILGE TK.(45CUB.M)
CALORIFIER
BLEND.F.O.HEATER
PURIF.L.O.HEATERS
BOILER F.O. HEATER
PURIF.F.O.HEATERS
BOTTOM L.O. RESERVE TANK
BOTTOM L.O. SUMP TANK
WASTE OIL TK. (15CUB.M)
M/ENG.F.O.HEATERS
DEEP F.O.TK.(P)
H.F.O.SETT.TK.(S) (115 CUB.M)
DEEP F.O.TK.(S)

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		USCG		ABS		USPH	
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	APRIL 4 '85	CFTS/MES-268			APRIL 26 '85	T-8-2	30 APRIL '85	—
△1	JUN 18 '85	CFTS/MES 574			JULY 17 '85	T-8-2		
△2	AUG 8 '85	CFTS/MES-843			OCT 4 '85	T-8-2	OCT 7 '85	—
△3	—	—			—	—	—	—

船主	2
SUP.	1
O.F.	2
USCG(MMD)	
USCG(本)	1
USCG(OCMI)	
USPH	0
ABS(N.O)	8
ABS(TOK)	
MHI(神戸)	1R
先画校	1
小計	18+4 +1R

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT
MANAGER

SHIP'S NO.

SHIP'S NAME: **TILLIE LYKES**

OUTFIT. DESIGN SEC. (PIPING)
SEC. CHIEF
ASST.
CHARGE
STAFF
DATE (TEL 2240)

空気管測深管及び注入管系統図

DIAGRAM OF AIR, SOUNDING & FILLING PIPES

JOB NO. TS1323/24/25
JOBCLASSIF. NO. D.16.07
SCALE 1/200
LYKES REF. NO. 480901
MITSUI DRAWING NO. 4116701

(31 SHEETS WITH COVER)

1/31

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN.	June 30, '86
		MADE APPLICABLE TO S.1324 AND S.1325.	

DWG. NO. 4116701 2/31

GENERAL NOTE

1. THE PIPES SHALL BE GALVANIZED, EXCEPT OVERFLOW PIPES FOR OIL TANKS AND THE PIPES WHICH ARE LED THROUGH WITHIN F.O. TANKS.
2. PET COCKS SHALL BE PROVIDED TO POT. WTR. TKS. FOR LEVEL DETECTING INSTEAD OF SOUNDING PIPES. (SEE PAGE 28 + 29) (SPEC. D.6-28)
3. FOR USPH APPROVAL MATTER SEE PAGE 5, 6, 8, 9, 16, 17, 18, 24, 26, 28 & 29)

DWG. NO. 4116701 3/31

REFERENCE

NO.	REF. NO. MES	REF. NO. LIKES	DWG. NO.	DWG. NAME
1		480001	4116002	PIPING PRACTICE
2		190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
3		482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
4		482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
5		482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS.
6		482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
7		482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
8		482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
9		482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
10		482608	5131205	GASKET (GENERAL USE)
11		480101	4116201	DIAGRAM OF BILGE, BALL. & F.O. LINES
12		481509	5131014	F.O. TRANSFER PIPING DIAGRAM IN ENG. RM
13		480401	5131023	FRESH WATER SERVICE PIPING DIAG. IN ENG. RM
14		482407	5233114	BRONZE VALVE
15		482404	5233111	CAST STEEL VALVES
16				
17				
18				
19				
20				

DWG. NO. 4116701 4/31

1726

PIPING LIST (2/4)

SYSTEM (SERVICE)		MAX. WORK. PRESS kg/cm²	WORK. TEMP. °C	HYD. TEST PRESS kg/cm²	MATERIAL		LIST NO. STANDARD	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
AIR PIPE	EXPOSED DK.	—	38	TO BE ACCOMPLISHED WITH ASSOCIATED TANK TEST	ELECTRIC RESISTANCE WELDED STEEL PIPE JIS G 3457 STPG 38-E EQUIV. TO ASTM A53 GRA [SEE REF.8]	GALVANIZED	AP-801~802	250A	10	267.4	9.3	40	10K	SLIP-ON FLANGE (IN GENERAL) & WELD SLEEVE & BUTT WELD. JOINTS [SEE REF.4]	FLANGE: ASTM A36 OR A105; SLEEVE: STS38-S JIS G3455 [EQUIV. TO ASTM A106 GR.A]; BUTT.WELD JOINT: STPT42-S JIS G3456 [EQUIV. TO ASTM A106 GR.B]	II	II
							810-817, " -822-839	200A	8	216.3	12.7	80					
							" -840-841	150A	6	165.2	11.0	"					
							" -850-874	125A	5	139.8	9.5	"					
							" -880-882	100A	4	114.3	8.6	"					
							" -890-893	80A	3	89.1	7.6	"					
							" -910-926	65A	2½	76.3	7.0	"					
						NOT GALV.	MR-525	65A	2½	76.3	5.2	40					
						GALV.	AP-960-961	200A	8	216.3	12.7	80					
							" -970-971	125A	5	139.8	9.5	"					
F.O. OVERFLOW PIPE	ENG. RM					NOT GALVANIZED	AP-894	250A	10	267.4	9.3	40					
							AP-895	200A	8	216.3	8.2	"					
	UND. DK. PASSAGE						AP-530-532	200A	8	216.3	8.2	40					
							AP-540-543	150A	6	165.2	7.1	40					
							AP-580-583	100A	4	114.3	6.0	40					
							AP-590-591	40A	1½	48.6	5.1	80					
	DEEP F.O. TK					NOT GALV.	AP-130-131	250A	10	267.4	9.3	40					
							" -140-141	200A	8	216.3	8.2	"					
							- -										

DWG NO 4116701 6/31

PIPING LIST (4/4)

SYSTEM (SERVICE)		MAX. WORK. PRESS kg/cm²	WORK. TEMP. °C	HYD. TEST PRESS kg/cm²	MATERIAL		LIST NO. STANDARD	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
SOUNDING PIPE	EXPOSED DK.	—	38	TO BE ACCOMPLISHED WITH ASSOCIATED TANK TEST	ELECTRIC RESISTANCE WELDED STEEL PIPE JIS G 3454 STPG 38-E EQUIV. TO ASTM A53 GRA [SEE REF.8]	GALVANIZING	843, SD-846~849	65A	2½	76.3	5.2	40	10K	SLIP-ON FLANGE (IN GENERAL) & WELD SLEEVE & BUTT WELD JOINT [SEE REF.4]	FLANGE: ASTM A36 OR A106; SLEEVE; STS38-S JIS G3455 [EQUIV. TO ASTM A106 GR.A]; BUTT WELD JOINT: STPT42-S JIS G3456 [EQUIV. TO ASTM A106 GR.B]	II	II
							852,853 " -858,859	"	"	"	"	"					
							880 " -871~874	"	"	"	"	"					
							921~928 " -931~932	40A	1½	48.6	5.1	80					
							" -933,934	"	"	"	"	"					
							" -935-936	65A	2½	76.3	7.0	80					
							- -										
							- -										
FILLING PIPE							MR-505	50A	2	60.5	3.9	40					
							MR-500	50A	2	60.5	3.9	40					
							- -										
							- -										
							- -										
							- -										
							- -										
							- -										
AIR PIPE (POTABLE W. TK.)		—	38		STAINLESS STEEL PIPE [ASTM A312 Gr TP304]	—	AP-490-493	80A	3	89.1	7.6	80	10K	SLIP-ON FLANGE & BUTT WELD JOINT	FLANGE [ASTM A182 Gr. F304]; BUTT WELD JOINT: [ASTM A312 Gr TP304]	II	
							- -										
FILLING PIPE (POTABLE W. TK)							TL-5-	65A	2½	76.3	7.0	80					

DWG NO 4116701 8/31

PIPING LIST (1/4)

SYSTEM (SERVICE)		MAX. WORK. PRESS kg/cm²	WORK. TEMP. °C	HYD. TEST PRESS kg/cm²	MATERIAL		LIST NO. STANDARD	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
AIR PIPE	IN BALL. TK.	—	38	TO BE ACCOMPLISHED WITH ASSOCIATED TANK TEST	ELECTRIC RESISTANCE WELDED STEEL PIPE JIS G 3454 STPG 38-E EQUIV. TO ASTM A53 GRA. [SEE REF. 8]	GALVANIZED	AP-126	50A	2	60.5	5.5	80	10K	SLIP-ON FLANGE (IN GENERAL) & WELDED SLEEVE & BUTT WELD. JOINT [SEE REF.4]	FLANGE: ASTM A36 OR A105; SLEEVE: STS38-S JIS G3455 [EQUIV. TO ASTM A106 GR.A]; BUTT. WELD JOINT. STPT42-S JIS G3456 [EQUIV. TO ASTM A106 GR.B]	II	II
							- -										
							- -										
	IN HOLD						- -										
							214~217, AP-220~223	200A	8	216.3	8.2	40					
							226~229, " -236,237	"	"	"	"	"					
							251~266, " -269,270	125A	5	139.8	6.6	"					
							" -280,281	100A	4	114.3	6.0	"					
							" -316~319	50A	2	60.5	5.5	80					
							- -										
	UND. DK. PASS., BOSUN ST., COFF., ST. G. RM., VOID SP.						AP-401,402	250A	10	267.4	9.3	40					
							410~415, " -	200A	8	216.3	8.2	"					
							424~427, " -430~439	"	"	"	"	"					
							450~456, " -459~462	125A	5	139.8	6.6	"					
							465~468, " -471~474	"	"	"	"	"					
							" -480~482	100A	4	114.3	8.6	80					
							- -										
							" -510~5[illegible]	50A	2	60.5	5.5	80					
						NOT GALV.	MR-520-	65A	2½	76.3	5.2	40	①				

DWG NO 4116701 5/31

PIPING LIST (3/4)

SYSTEM (SERVICE)		MAX. WORK. PRESS kg/cm²	WORK. TEMP. °C	HYD. TEST PRESS	MATERIAL		LIST NO. STANDARD	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	PRESS STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
SOUNDING PIPE	IN BALL. TK.	—	38	TO BE ACCOMPLISHED WITH ASSOCIATED TANK TEST	ELECTRIC RESISTANCE WELDED STEEL PIPE JIS G 3454 STPG 38-E EQUIV. TO ASTM A53 GRA [SEE REF.8]	GALVANIZED	41,43, SD-46~49	65A	2½	76.3	5.2	40	10K	SLIP-ON FLANGE (IN GENERAL) & WELD SLEEVE & BUTT WELD JOINT [SEE REF.4]	FLANGE: ASTM A36 OR A105; SLEEVE: STS38-S JIS G3455 [EQUIV. TO ASTM A106 GR.A]; BUTT. WELD JOINT STPT42-S JIS G3456 [EQUIV. TO ASTM A106 GR.B]	I	II
							52,53 " -56~67	"	"	"	"	"					
							71,72 " -75,76	"	"	"	"	"					
							" -83	"	"	"	"	"					
							- -										
	IN F.O. TK.					NOT GALVANIZED	250,251 SD-254,255	65A	2½	76.3	5.2	40					
							" -268,269	"	"	"	"	40					
							" -368,369	"	"	"	7.0	80					
							- -										
	IN HOLD					GALVANIZED	443,480 SD-446~449	65A	2½	76.3	5.2	40					
							452,453 " -458,459	"	"	"	"	"					
							464~467 " -473,474	"	"	"	"	"					
							533,534 " -521~532	40A	1½	48.6	5.1	80					
	UND. DK. PASS., BOSUN ST., COFF., ST.G.RM., VOID SP., DUCT KEEL						680~683, SD-691~693	65A	2½	76.3	5.2	40					
							640~642 SD-643~646	65A	2½	76.3	5.2	40					
							650,651, " -654~657	"	"	"	"	"					
							660~663 " -670~677,679	"	"	"	"	"					
							" -668,669	65A	"	"	7.0	80					
							720, " -	40A	1½	48.6	5.1	80					

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1727

FITTING LIST (2/2)

SYMBOL	TYPE	SERVICE	PRESS. RATE kg/cm²	MAX. WORK. PRESS. kg/cm²	WORK. TEMP. °C	MATERIAL BODY	MATERIAL	MATERIAL	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
	SOUND. PIPE HEAD WITH SCREWED CAP (SEE PAGE 21/31)	BILGE	10	—	38	CAST BRONZE BC6 JIS H5111 [EQUIV. TO ASTM B62]	—	—	65	2½	5	SDV-1, 3~5, 10	S/A 4216 719
									40	1½	1	SDV-16	
		BALL. W.							65	2½	7	SDV-2, 8, 9, 20~23	
		F.O.			45				〃	〃	4	SDV-6, 7, 48, 49	
	SELF CLOSING TYPE SOUND. PIPE HEAD (SEE PAGE 22/31)	BALL. W.			38				65	2½	8	SDV-54~61	S/A 4216 714
		FRESH W.							〃	〃	1	SDV-62	
		F.O.			45				〃	〃	4	SDV-50~53	
		BILGE							〃	〃	4	SDV-63, 64~66	
	FLUSH TYPE SOUND. PIPE HEAD (SEE PAGE 23/31)	BALL. W			38		LINER; STEEL SS41P JIS G3101 (EQUIV. TO ASTM A36)		65	2½	9	SDV-24~28, 40~43	S/A 4216 719
									40	1½	2	SDV-46, 47	
		BILGE							65	2½	2	SDV-44, 45	
									40	1½	12	SDV-30~39, 130, 131	
		F.O.							65	2½			
	PET COCK (SEE PAGE 24/31)	POTABLE WATER	10	1.0	38	CAST BRONZE BC6, JIS H5111 (EQUIV. TO ASTM B62)			10	3/8	A/R	SDV-101	
	BELLOWS TYPE EXPANSION JOINT (SEE PAGE 26/31)	F.O.	3.5	1.0	45	BELLOWS: SUS316 (EQUIV. TO ASTM A 204-316) FLG.: SS41 (EQUIV. TO ASTM A36)	—	—	200	8	12	APV-131	
	SOUNDING TAPE	(ALL)	–	–	–	(MILD STEEL & WOODEN GRIP)					2	ℓ=25M	TO BE SUPPLIED AS INVENTRY

DWG. NO 4116701 15/31

FITTING LIST (1/2)

SYMBOL	TYPE	SERVICE	PRESS. RATE (kg/cm²)	MAX. WORK. PRESS.	WORK. TEMP.	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS
	DISC FLOAT TYPE AIR PIPE HEAD (SEE PAGE 18/31 & 19/31)	W.B.	10	—	38	DUCTILE CAST IRON FCD45 JIS G5502 (EQUIV. TO ASTM A395)	—	—	250	10	2	APV-1, 2	S/A 4216 713
									200	8	26	〃-6~31	
									125	5	21	〃-36~56	
									100	4	2	〃-60, 61	
		BILGE							65.	2½	16	〃-70~85	
	DISC FLOAT TYPE AIR PIPE HEAD WITH WIRE NET SCREEN (SEE PAGE 18/31 & 19/31)	F.O.			45				200	8	4	APV-584, 585, 86, 87	
									125	5	2	〃-96, 97	
		FRESH W							80	3	5	〃-66~69, 88	
									65	1½	1	APV-189	
		HYD. OIL							65	2½	1	MRV-511	S/A 4201419
	STOP GLOBE VALVE	SEA. WATER			38	CAST STEEL SC49 JIS G5105 EQUIV. TO ASTM A216	(SEE REF. NO. 15)		100	4	1	APV-100	S/A 4216723
	STOP GLOBE VALVE (SEE PAGE 24/31)	F.O.	16			CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)	STAINLESS STEEL SUS304 JIS G4303 (EQUIV. TO ASTM A276-304)	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)	40	1½	2	APV-129, 130	S/A 4216722
		FRESH W							〃	〃	4	SDV-102	
	FLOAT CHECK VALVE FOR OVERFLOW PIPE (SEE PAGE 20/31)	F.O.	10		45	CAST STEEL SC46 JIS G5101 (EQUIV. TO ASTM A216 WCA)	—	[FLOAT] STAINLESS STEEL SUS304 JIS G4304 EQUIV. TO ASTM A240, 304	150	6	4	APV-121~124	S/A 4216713
									100	4	4	APV-125~128	
	FILLING CAP FOR POTABLE WATER TK (SEE ATT. DWG)	POTABLE WATER			38	CAST BRONZE BC6 JIS H5111 (EQUIV. TO ASTM B62)	—	—	65	2½	2	FLV-1, 5	

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(1/4)

Unit : mm

TANK NAME	Kind	SOUNDING PIPE Nomi. Size	Out Dia.	In Dia.	Thick.	Material	(List No.) Remark	AIR PIPE Nomi. Size	Out Dia.	In Dia.	Thick.	Total of Sec. Area	Material	(List No.) Remark	FILLING PIPE Nomi. Size	Out Dia.	In Dia.	Sec. Area×1.25	Remark
DEEP W.B.T.	W.B.	65	76.3	65.6	5.2	STPG38-E (SCH.40)	SD-41	200 / 125	216.3 / 139.8	199.9 / 126.6	8.2 / 6.6	43972.5	STPG38-E (SCH.40)	AP-410 / AP-450	200	216.3	199.9	39230.6	STEEL PIPE
NO.1 BTM W.B.T.							-43	200 / 100×2	216.3 / 114.3×2	199.9 / 102.3	8.2 / 6.0	47823.2		-411 / -389 -221					
NO.2 FORE W.B.T.(S)							-46	200 / 125	216.3 / 139.8	199.9 / 126.6	8.2 / 6.6	43972.5		-412 / -451					
〃 〃 (P)							-47							-413 / -452					
NO.2 AFT W.B.T.(S)							-48							-414 / -453					
〃 〃 (P)	W.B.						-49							-415 / -454					
NO.3 FORE W.F.O.T.(S)	F.O.						-250	150 / 100	165.2 / 114.3	151.0 / 102.3	7.1 / 6.0	26127.3		-418 / -455	150	165.2	143.2	20132.0	STEEL PIPE
〃 〃 (P)							-251							-419 / -456					
NO.3 AFT W.F.O.T.(S)							-254							-420 / -459					
〃 〃 (P)	F.O.						-255							-421 / -460					
NO.3 BTM W.B.T.(S)	W.B.						-52	200 / 125	216.3 / 139.8	199.9 / 126.6	8.2 / 6.6	43972.5		-216 / -257	200	216.3	199.9	39230.6	STEEL PIPE
〃 〃 (P)							-53							-217 / -258					
NO.4 FORE W.W.B.T.(S)							-56							-424 / -461					
〃 〃 (P)	W.B.	65	76.3	65.6	5.2	STPG38-E (SCH.40)	SD-57	200 / 125	216.3 / 139.8	199.9 / 126.6	8.2 / 6.6	43972.5	STPG38-E (SCH.40)	AP-425 / AP-462					

[AIR PIPE]

DWG. NO. 4116701. 12/31

STANDARD SIZE AND SECTIONAL AREA OF STEEL PIPE

NOMI. DIA. (mm)	OAT. DIA. (mm)	SGP THICK. (mm)	SGP INN. DIA. d (mm)	SGP SECT. AREA A (mm2)	SGP 1.25*A (mm2)	SCH40 & STD/WT(※) THICK. (mm)	INN. DIA. d (mm)	SECT. AREA A (mm2)	1.25*A (mm2)	SCH80 & X/ST(△) THICK. (mm)	INN. DIA. d (mm)	SECT. AREA A (mm2)	1.25*A (mm2)
15	21.7	2.8	16.1	203.6	254.5	2.8	16.1	203.6	254.5	3.7	14.3	160.6	200.8
20	27.2	2.8	21.6	366.4	458.0	2.9	21.4	359.7	449.6	3.9	19.4	295.6	369.5
25	34.0	3.2	27.6	598.3	747.9	3.4	27.2	581.1	726.3	4.5	25.0	490.9	613.6
40	48.6	3.5	41.6	1359.2	1699.0	3.7	41.2	1333.2	1666.5	5.1	38.4	1158.1	1447.6
50	60.5	3.8	52.9	2197.9	2747.3	3.9	52.7	2181.3	2726.6	5.5	49.5	1924.4	2405.5
65	76.3	4.2	67.9	3621.0	4526.3	5.2	65.9	3410.8	4263.5	7.0	62.3	3048.4	3810.4
80	89.1	4.2	80.7	5114.9	6393.6	5.5	78.1	4790.6	5988.3	7.6	73.9	4289.2	5361.5
90	101.6	4.2	93.2	6822.2	8527.7	5.7	90.2	6390.0	7987.5	8.1	85.4	5728.0	7160.0
100	114.3	4.5	105.3	8708.6	10885.7	6.0	102.3	8219.4	10274.3	8.6	97.1	7405.1	9256.3
125	139.8	4.5	130.8	13437.1	16796.4	6.6	126.6	12588.0	15735.0	9.5	120.8	11461.0	14326.3
150	165.2	5.0	155.2	18917.9	23647.4	7.1	151.0	17907.9	22384.8	11.0	143.2	16105.6	20132.0
200	216.3	5.8	204.7	32909.8	41137.3	8.2	199.9	31384.5	39230.6	12.7	190.9	28622.1	35777.6
250	267.4	6.6	254.2	50750.6	63438.2	9.3	248.8	48617.3	60771.6	△12.7	242.0	45996.1	57495.1
300	318.5	6.9	304.7	72918.0	91147.5	※9.5	299.5	70450.4	88063.0	△12.7	293.1	67471.7	84339.6
350	355.6	7.9	339.8	90685.2	113356.6	※9.5	336.6	88985.3	111231.6	△12.7	330.2	85633.6	107042.0
400	406.4					※9.5	387.4	117871.6	147339.5	△12.7	381.0	114009.2	142511.5
450	457.2					※9.5	438.2	150811.6	188514.4	△12.7	431.8	146438.5	183048.1

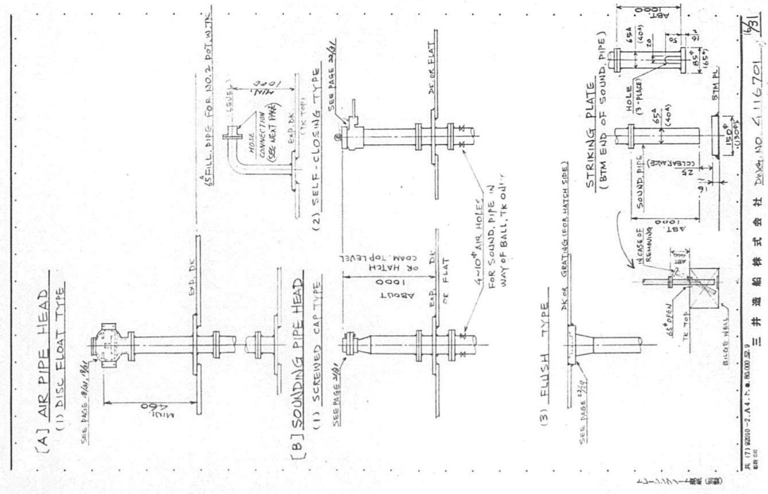
DWG. NO. 4116701 11/31

(3/4)

Unit : mm

TANK NAME	Kind	SOUNDING PIPE Nomi. Size	Out Dia.	In Dia.	Thick.	Material	(LIST NO.) Remark	AIR PIPE Nomi. Size	Out Dia.	In Dia.	Thick.	Total of Sec. Area	Material	(LIST NO.) Remark	FILLING PIPE Nomi. Size	Out Dia.	In Dia.	Sec. Area	Remark
NO.6 WING W.B.T.(S)	W.B.	65	76.3	65.6	5.2	STPG38-E (SCH.40)	SD-71	200 125	216.3 139.8	199.9 126.6	8.2 6.6	43972.5	STPG38-E (SCH.40)	AP-436 AP-471	200	216.3	199.9	39230.6	STEEL PIPE
〃 (P.)	↕	↕	↕	↕	↕	↕	-72	↕	↕	↕	↕	↕	↕	-437 -472	↕	↕	↕	↕	↕
A.P.T.(S)	↕	↕	↕	↕	↕	↕	-75	↕	↕	↕	↕	↕	↕	-438 -473	↕	↕	↕	↕	↕
〃 (P.)	W.B.	↕	↕	↕	↕	↕	-76	200 125	216.3 139.8	199.9 126.6	8.2 6.6	43972.5	STPG38-E (SCH.40)	-439 -474	200	216.3	199.9	39230.6	STEEL PIPE
F.P.T. (VOID)	BL.	65	76.3	65.6	5.2	STPG38-E (SCH.40)	-40	50×2	60.5	49.5	5.5	3848.8	STPG38-E (SCH.80)	AP-510, 511					
CHAIN LKR	↕	40	48.6	38.4	5.1	STPG38-E (SCH.20)	-720												
NO.1 HOLD	↕	↕	↕	↕	↕	↕	-521, 522												
2	↕	↕	↕	↕	↕	↕	-523, 524												
3	↕	↕	↕	↕	↕	↕	-525, 526												
4	↕	↕	↕	↕	↕	↕	-527, 528												
5	↕	↕	↕	↕	↕	↕	-529, 530, 533, 534												
NO.6 HOLD	↕	40	48.6	38.4	5.1	STPG38-E (SCH.80)	-531, 532												
VOID SP. (FR.266~287)	〃	65	76.3	65.6	5.2	STPG38-E (SCH.40)	-642	50×2	60.5	49.5	5.5	3848.8	STPG38-E (SCH.80)	AP-512, 513					
COFF. (NO.1 HOLD)	↕	〃	〃	〃	〃	〃	-644, 645	50×4	60.5	49.5	5.5	7697.6	〃	〃 -514~517					
VOID SP. (FR.12~31)	BL.	65	76.3	65.6	5.2	STPG38-E (SCH.40)	SD-673, 674	50×2	60.5	48.5	5.5	3848.8	〃	AP-518, 519					

DWG NO 4116701 14/31



(2/4)

Unit : mm

TANK NAME	Kind	SOUNDING PIPE Nomi. Size	Out Dia.	In Dia.	Thick.	Material	(LIST NO.) Remark	AIR PIPE Nomi. Size	Out Dia.	In Dia.	Thick.	Total of Sec. Area	Material	(LIST NO.) Remark	FILLING PIPE Nomi. Size	Out Dia.	In Dia.	Sec. Area	Remark
NO.4 AFT W.W.B.T.(S)	W.B.	65	76.3	65.6	5.2	STPG38-E (SCH.40)	SD-60	200 125	216.3 139.8	199.9 126.6	8.2 6.6	43972.5	STPG38-E (SCH.40)	AP-426 AP-465	200	216.3	199.9	39230.6	STEEL PIPE
〃 (P.)	↕	↕	↕	↕	↕	↕	-61	↕	↕	↕	↕	↕	↕	-427 -466	↕	↕	↕	↕	↕
NO.4 BTM W.B.T.(S)	↕	↕	↕	↕	↕	↕	-58	↕	↕	↕	↕	↕	↕	-222 -263	↕	↕	↕	↕	↕
〃 (P.)	↕	↕	↕	↕	↕	↕	-59	↕	↕	↕	↕	↕	↕	-223 -264	↕	↕	↕	↕	↕
NO.5 WING W.B.T.(S)	↕	↕	↕	↕	↕	↕	-62	↕	↕	↕	↕	↕	↕	-430 -467	↕	↕	↕	↕	↕
〃 (P.)	↕	↕	↕	↕	↕	↕	-63	↕	↕	↕	↕	↕	↕	-431 -468	↕	↕	↕	↕	↕
NO.5 BTM W.B.T.(S)	↕	↕	↕	↕	↕	↕	-64	↕	↕	↕	↕	↕	↕	-228 -269	↕	↕	↕	↕	↕
〃 (P.)	↕	↕	↕	↕	↕	↕	-65	200 125	216.3 139.8	199.9 126.6	8.2 6.6	43972.5	↕	-229 -270	↕	↕	↕	↕	↕
ANTI. HEEL.T.(S)	↕	↕	↕	↕	↕	↕	-66	200×2 250	216.3 267.4	199.9 248.8	8.2 9.3	133219.4	↕	-432 -434 -401	350	355.6	336.6	111231.6	↕
〃 (P.)	W.B.	↕	↕	↕	↕	↕	-67	〃 〃	〃 〃	〃 〃	〃 〃	〃	↕	-433 -435 -402	〃	〃	〃	〃	↕
DEEP F.O.T.(S)	F.O.	↕	↕	↕	↕	↕	-268	250 150	267.4 165.2	247.8 151.0	9.3 7.1	66525.7	↕	-803 -840	200	216.3	199.9	39230.6	STEEL PIPE
〃 (P.)	〃	65	76.3	65.6	5.2	STPG38-E (SCH.40)	SD-269	〃 〃	〃 〃	〃 〃	〃 〃	〃	STPG38-E (SCH.40)	AP-809 AP-841	〃	〃	〃	〃	〃
COOL.W.T.	F.W.	〃	〃	〃	〃	〃	SD-77	50	60.5	49.5	5.5	1924.4	STPG38-E (SCH.80)	〃 -120	40	48.6	41.2	1666.5	
NO.1 POT. W.T.(S)	F.W.	←(NONE)→ (PET COCKS SHALL BE PROVIDED)						80×2	89.1	78.1	5.5	9581.2	STPG38-E (SCH.40)	〃 -490 -492	65×2	76.3	62.3	7620.8	STEEL PIPE
〃 (P)	〃	DO.						80×2	〃	〃	〃	9581.2	〃	〃 -491 -493	〃	〃	〃	〃	〃

DWG NO 4116701 13/31

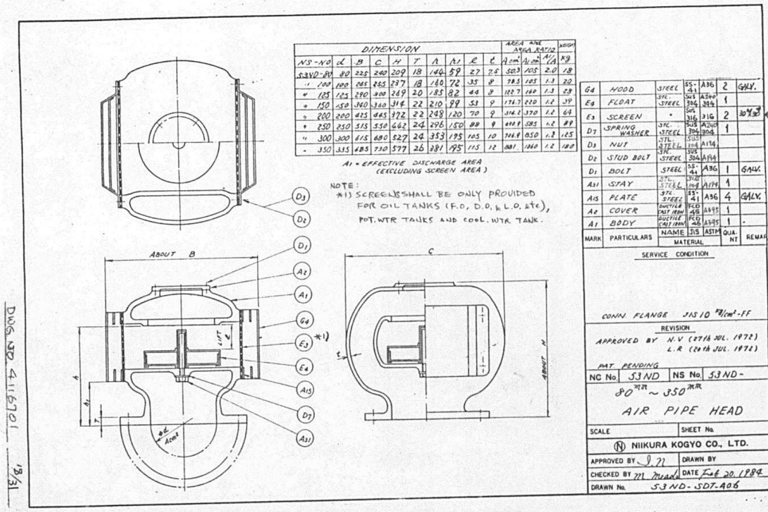
(4/4)

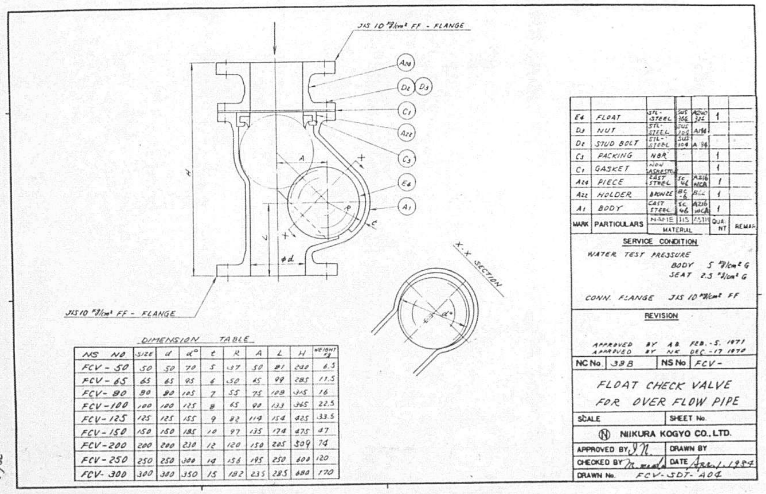
Unit : mm

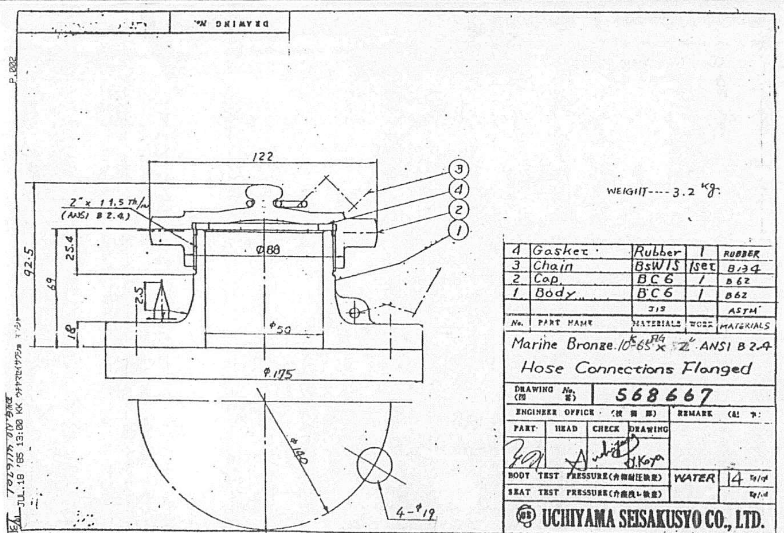
TANK NAME	Kind	SOUNDING PIPE Nomi. Size	Out Dia.	In Dia.	Thick.	Material	(LIST NO.) Remark	AIR PIPE Nomi. Size	Out Dia.	In Dia.	Thick.	Total of Sec. Area	Material	(LIST NO.) Remark	FILLING PIPE Nomi. Size	Out Dia.	In Dia.	Sec. Area	Remark
VOID SP (AFT END-FR.10) (P&S)	BL.	←(NONE)→						50^A×2	60.5	52.7	3.9	4362.6	STPG38-E (SCH.40)	AP-523,525 (AP-524,526)	←(NONE)→				
No.2 POT. W.TK(S)	F.W.	←(NONE)→ (PET COCKS SHALL BE PROVIDED)						80^A	89.1	73.9	7.6	4289.2	DO (SCH.80)	AP-894	65^A	76.3	62.3	3810.4	STEEL PIPE

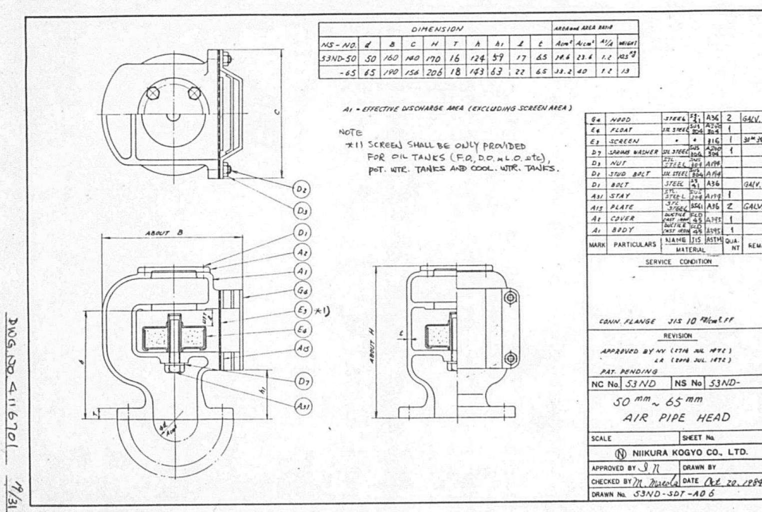
DWG NO 4116701

1729

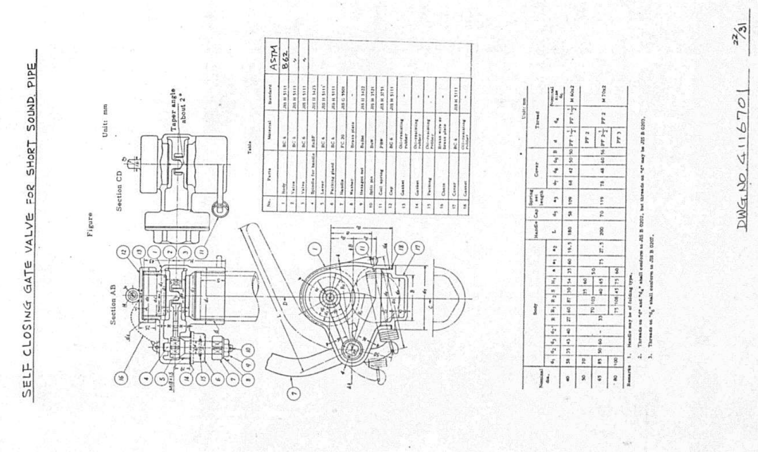

DWG NO 4116701
CONN. FLANGE JIS 10 K/cm² FF
APPROVED BY N.V (27th JUL. 1972) L.R (26th JUL. 1972)
PAT. PENDING
NC No 53ND
NS No 53ND-
80 mm ~ 350 mm
AIR PIPE HEAD
NIIKURA KOGYO CO., LTD.
53ND-SDT-A06

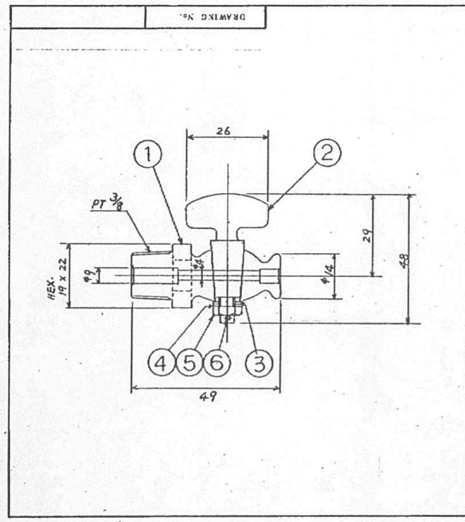

DWG NO 4116701
JIS 10 K/cm² FF - FLANGE
X-X SECTION
DIMENSION TABLE
WATER TEST PRESSURE
CONN. FLANGE JIS 10 K/cm² FF
NC No 398
NS No FCV-
FLOAT CHECK VALVE
FOR OVER FLOW PIPE
NIIKURA KOGYO CO., LTD.
FCV-SDT-A04


WEIGHT --- 3.2 kg.
4 Gasket Rubber 1
3 Chain BsW1S 1set
2 Cap. BC6 1
1 Body BC6 1
Marine Bronze.
Hose Connections Flanged
568667
UCHIYAMA SEISAKUSYO CO., LTD.


DWG NO 4116701
CONN. FLANGE JIS 10 K/cm² FF
PAT. PENDING
NC No 53ND
NS No 53ND-
50 mm ~ 65 mm
AIR PIPE HEAD
NIIKURA KOGYO CO., LTD.
53ND-SDT-A06

1730





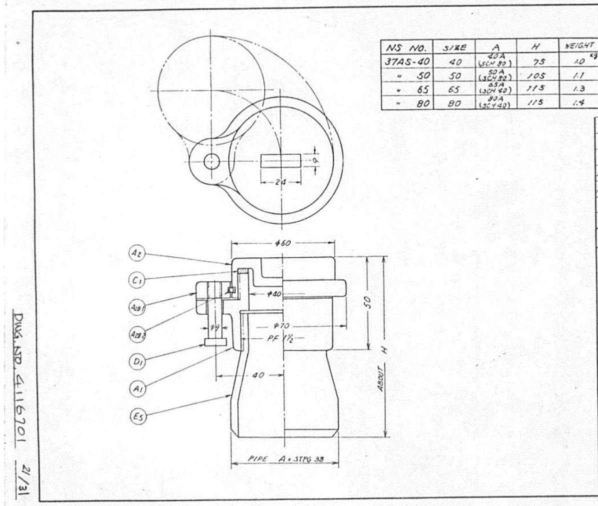
No.	PART NAME	MATERIAL	JIS	ASTM
6	SPLIT PIN	BRASS	BSW1	B134
5	NUT	BRASS	BS3F	B123
4	SPRING WASHER	SPRING ST.	SWPA	A230
3	WASHER	BRASS	BsP	B36
2	PLUG	BRONZE	BC6	B62
1	BODY	BRONZE	BC6	B62

PET COCK (PT 3/8)

DRAWING No. 881077

ENGINEER OFFICE | REMARK

MANAG. | CHIEF. | CHECKED | DRAWER | DATE:



NS NO.	SIZE	A	H	WEIGHT kg
37AS-40	40	40A (SCH 80)	75	1.0
〃 50	50	50A (SCH 80)	105	1.1
〃 65	65	65A (SCH 40)	115	1.3
〃 80	80	80A (SCH 40)	115	1.4

MARK	PARTICULARS	MATERIAL NAME	JIS	ASTM	QUANT	REMARK
E5	REDUCER	STEEL	STP		1	
D1	BOLT	STL. STEEL	SUS 304	A194	1	
C1	GASKET	NEO PRENE	CR		1	
A2B-2	RING	PHOSPHOR BRONZE	C5100 W	F7000 W	1	
A2B-1	RING	BRONZE	BC6	B62	1	
A2	COVER	BRONZE	BC6	B62	1	
A1	BODY	BRONZE	BC6	B62	1	

SERVICE CONDITION

REVISION

NC No 37A | NS No 37AS-

CAP FOR SOUNDING PIPE
S-TYPE

SCALE | SHEET No.

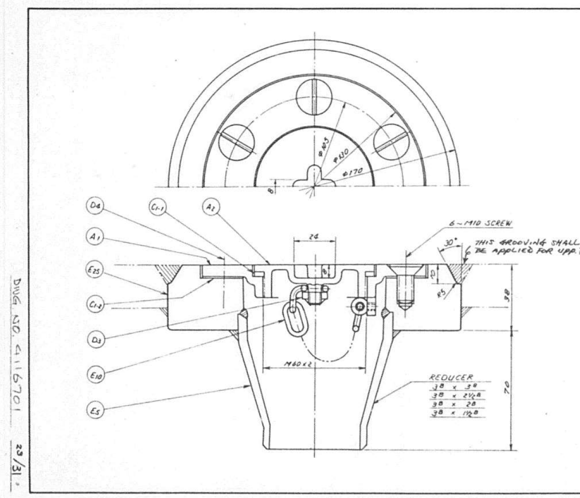
NIIKURA KOGYO CO., LTD.

APPROVED BY S.N. | DRAWN BY

CHECKED BY M. Maeda | DATE Oct 20, 1973

DRAWN No. 37AS-SDT-A04

4-11



MARK	PARTICULARS	MATERIAL NAME	JIS	ASTM	QUANT	REMARKS
E25	LINER	STEEL	SS41	A36	1	
E10	CHAIN	BRASS	C2600 W		15	
E5	PIPE or REDUCER	STEEL	SS41	A53	1	
D4	SCREW	BRASS	C3771 B	B16 36000	6	
D3	NUT	BRASS	C3604 B	B16 36000	1	
C1-2	GASKET	NON ASBESTOS			1	
C1-1	GASKET	NEO PRENE			1	
A2	COVER	BRONZE	BC6	B62	1	
A1	BODY	BRONZE	BC6	B62	1	

SERVICE CONDITION

REVISION

NC No 37 BN | NS No 37 BN-B

DECK PIECE "B" TYPE
FOR SOUNDING PIPE

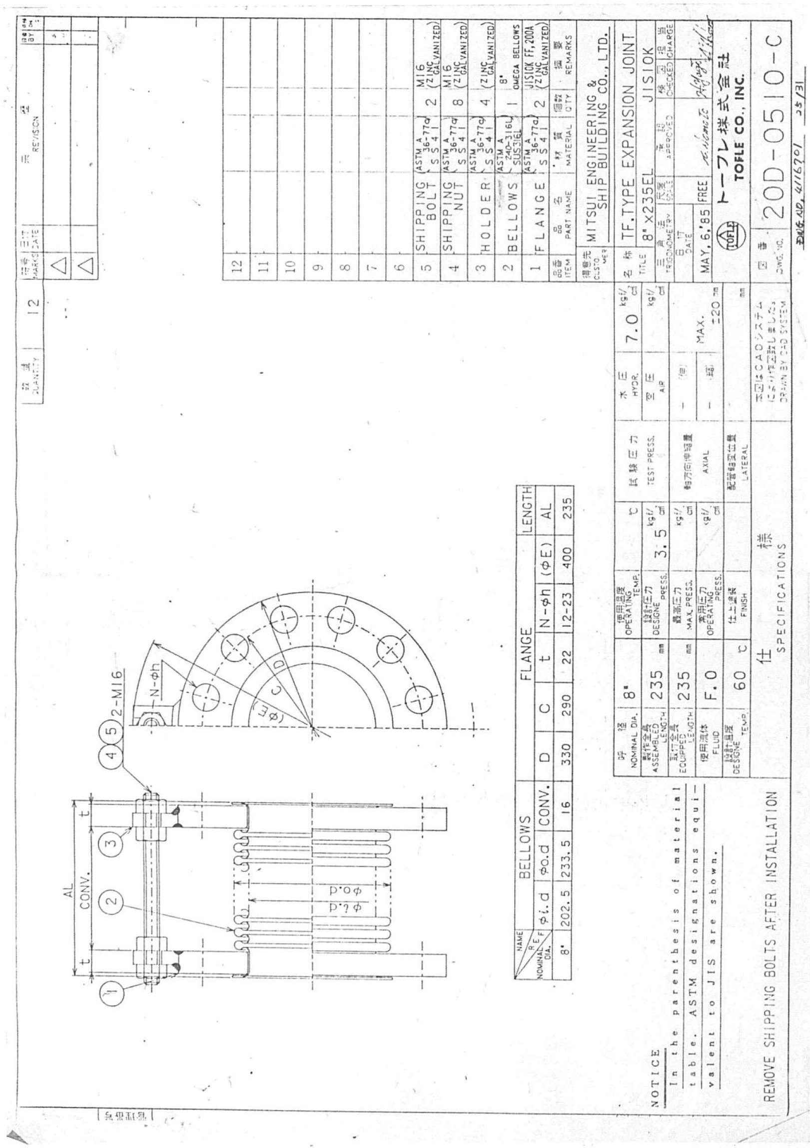
SCALE | SHEET No.

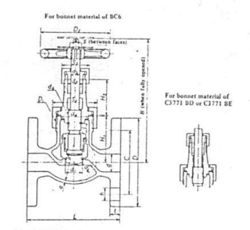
NIIKURA KOGYO CO., LTD.

APPROVED BY S.N. | DRAWN BY

CHECKED BY M. Maeda | DATE Feb. 20. 1977

DRAWN No. 37-BN-B-A03





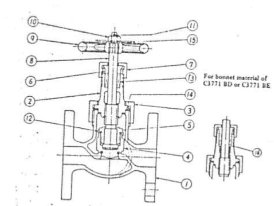
Bolt holes of flanges shall straddle body center lines.

Unit: mm

Nominal dia.	d	d_1	L	Flange D	Bolt hole P.C. dia. C	Bolt hole No.	Bolt hole h	Nominal of bolt dia.	t	Height (fully opened) H	Lift l	Handwheel D_2	Body d_2	Body a	Body R	Body H_1	Body Threads D_1	Body d_3	Ht. of bonnet H_2	Stem d_4	Stem Threads d_4	Stem S	Stuffing box d_5	Between faces S_1	Between faces S_2	Reference Calculated mass (kg)
15	15	15	110	95	70	4	15	M12	12	155	10	80	37	4	37	55	M45×2	32	43	10	TW14	8	17	55	32	2.96
20	20	20	120	100	75	4	15	M12	14	165	12	100	45	4	45	60	M48×2	35	47	12	TW16	10	19	55	36	3.92
25	25	25	130	125	90	4	19	M16	14	185	14	125	52	4	52	68	M52×2	38	54	13	TW18	10	21	60	36	5.65
32	32	32	160	135	100	4	19	M16	16	192	17	125	65	5	65	70	M60×2	42	56	13	TW18	10	21	70	36	7.24
40	40	40	180	140	105	4	19	M16	16	210	20	140	80	6	80	78	M66×2	50	59	15	TW20	12	23	80	41	9.12

Remarks 1. The flanges shall conform to nominal pressure 16 kgf/cm² of JIS B 2240.
2. The threads d_4 shall conform to JIS B 0222, and D_1 to JIS B 0207.
3. The name plate shall be specified by purchaser as required.

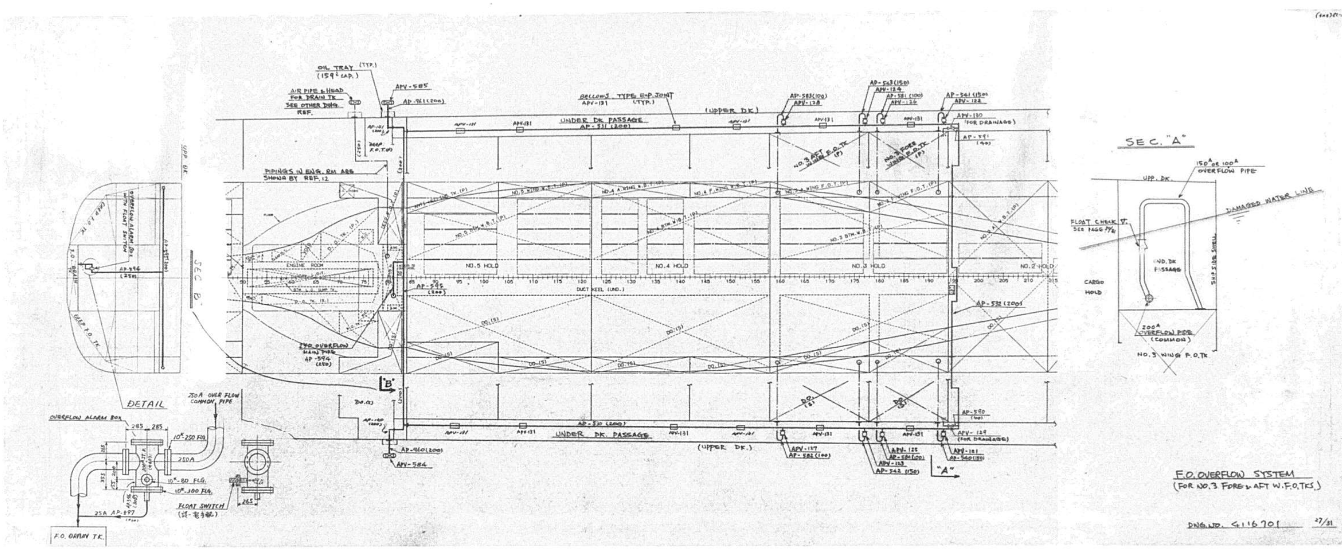
Fig. 1



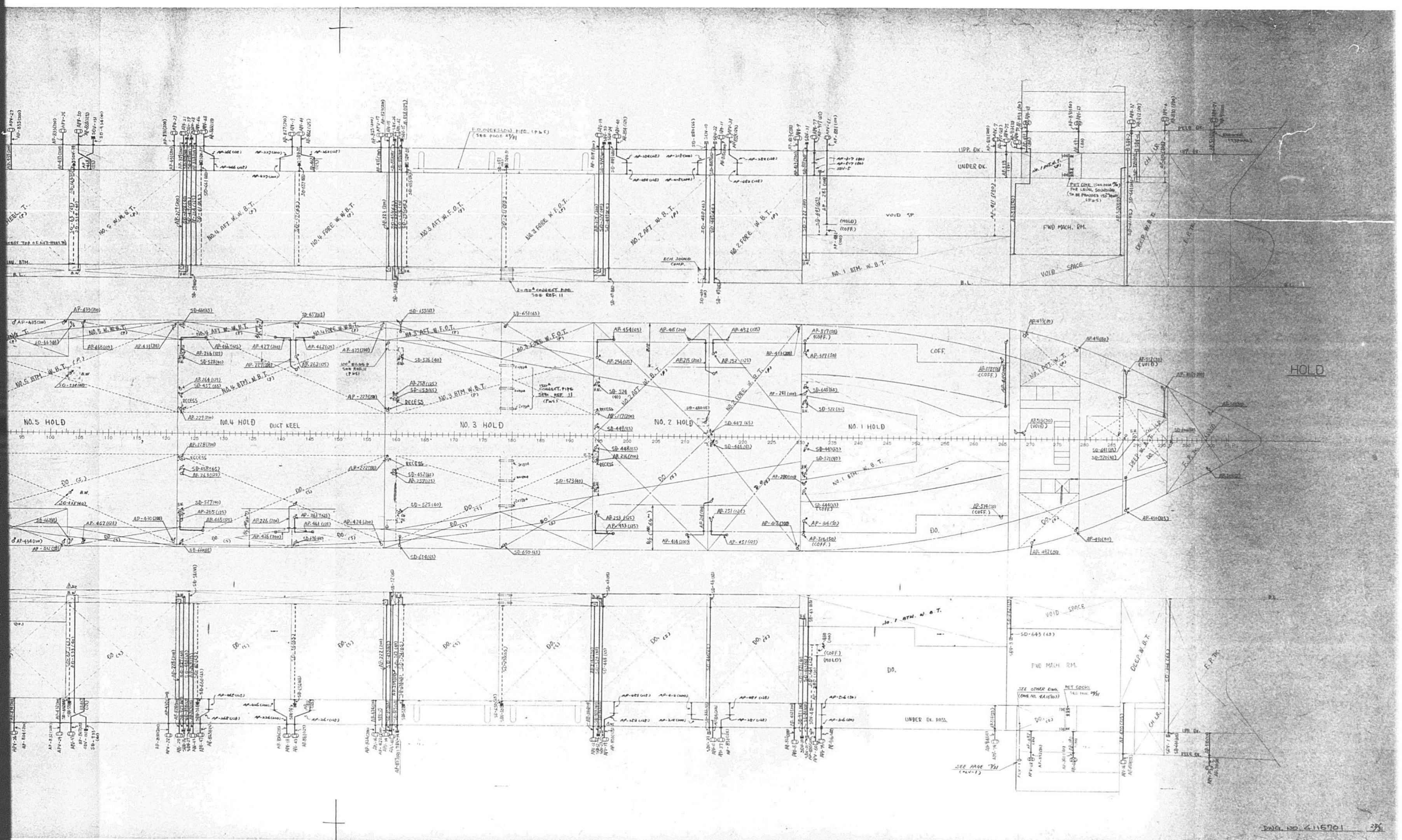
No.	Component	Material
1	Body	JIS H 5111 – BC6 (ASTM-B62)
2	Bonnet	
3	Bonnet nut	~~JIS H 3250 – C 3771 BD or C 3771 BE or~~ JIS H 5111 – BC6 (ASTM-B62)
4	Disc	
5	Disc nut	
6	Packing gland	~~JIS H 3250 – C 3771 BD or~~ JIS H 5111 – BC6 (ASTM-B62)
7	Gland nut	JIS G 4303
8	Stem	~~JIS H 3250 – C 3771 BD or JIS H 5111 – BC6~~ (ASTM A276 TYPE 304)
9	Handwheel	JIS G 5501 – FC 20 (ASTM A126 GRDE A)
10	Hexagon nut	JIS H 3250 – C 3771 BD (ASTM B124 C37700)
11	Split pin	JIS H 3260 – C 2600 W
12	Disc lock washer	~~JIS H 3100 – C 2600 P~~ JIS G 4303 SUS303P (ASTM A240 TYPE 304)
13	Packing	~~JIS P 7102~~ NON ASBESTOS
14	Gasket	
15	Name plate	JIS H 3100 – C 2801 P
16	Seat ring	JIS H 3250 – C 3771 BD or C 3771 BE

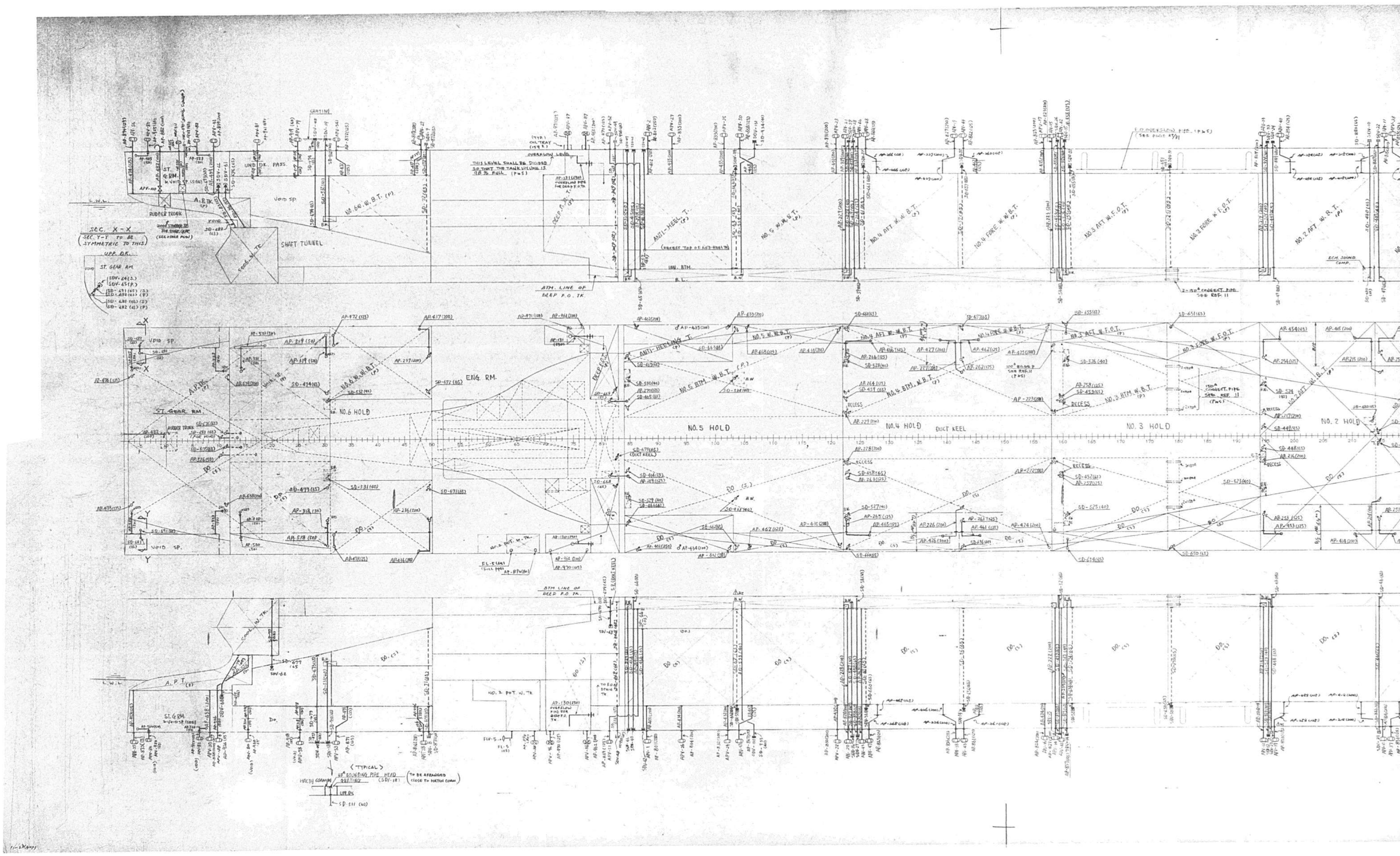
Remarks Letters in boldface show the materials specified in 4. (1).

Fig. 2


F.O. OVERFLOW SYSTEM
(FOR NO.3 FORE & AFT W.F.O.TKS.)
SEC. "A"
DETAIL
UNDER DK PASSAGE

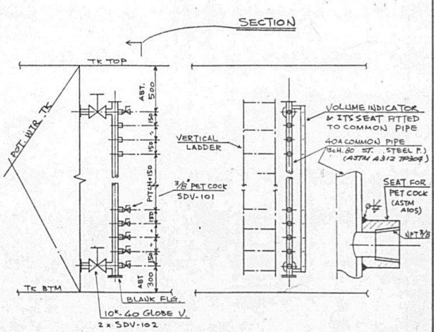
1733


UPP. DK.
UNDER DK.
VOID SP.
FWD MACH. RM.
VOID SPACE
NO. 1 BTM. W.B.T.
HOLD
NO. 5 HOLD
NO. 4 HOLD
DUCT KEEL
NO. 3 HOLD
NO. 2 HOLD
NO. 1 HOLD
COFF.
UNDER DK. PASS.
DWG. NO. 6116701


SEC. X-X
SHAFT TUNNEL
ST. GEAR RM.
NO.6 HOLD
ENG. RM.
NO.5 HOLD
NO.4 HOLD
DUCT KEEL
NO.3 HOLD
NO.2 HOLD
VOID SP.
A.P.T.
(TYPICAL)

2/2 1735

HISTORY



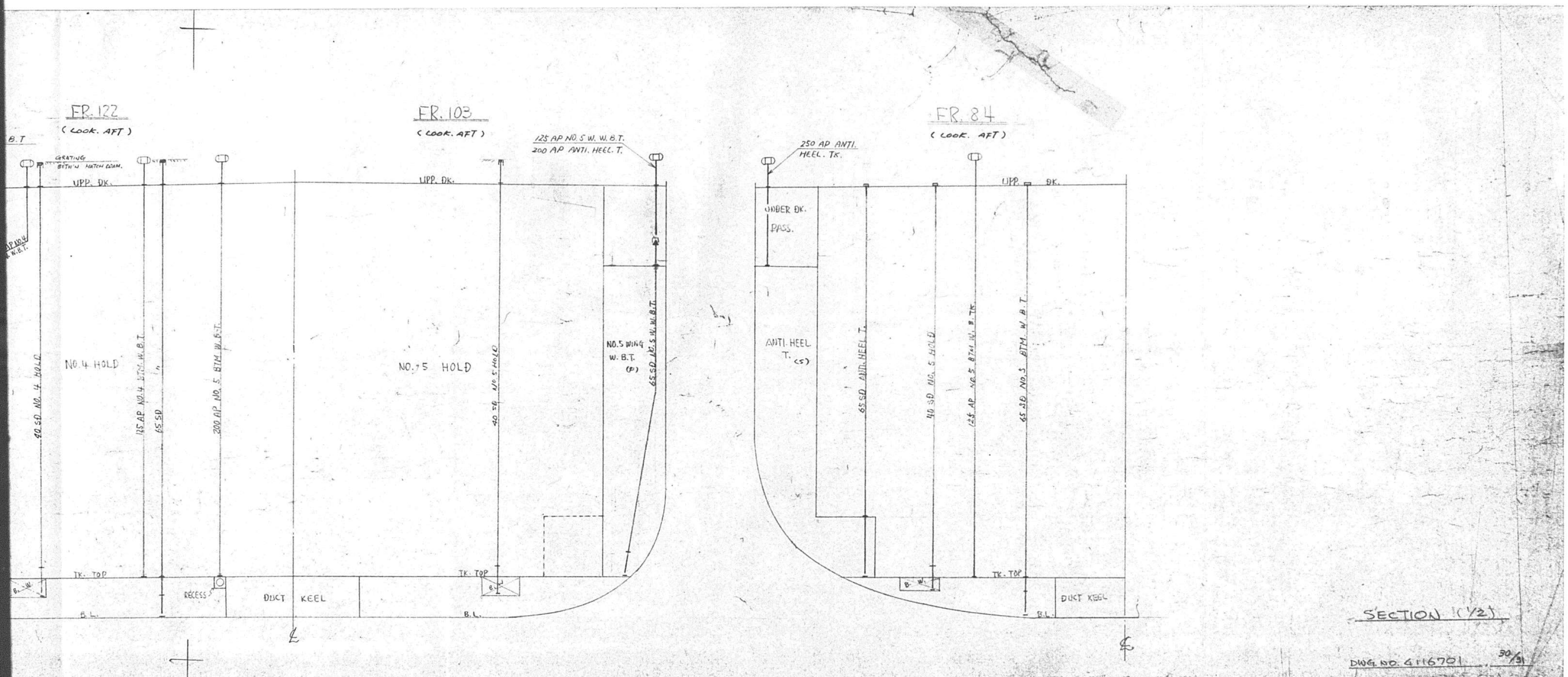
符号 NO.	名称 NAME	材料 MATERIAL	試験片 TEST PIECE	常備 USE	予備 SPARE	合計 TOTAL	関係工場 WORK SHOP	1個 ONE	合計 TOTAL	記事 REMARKS
				製造個数 QUANTITY				重量(KG) WEIGHT		

製造個数は　　分を示す　　　　分製造のこと。

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS

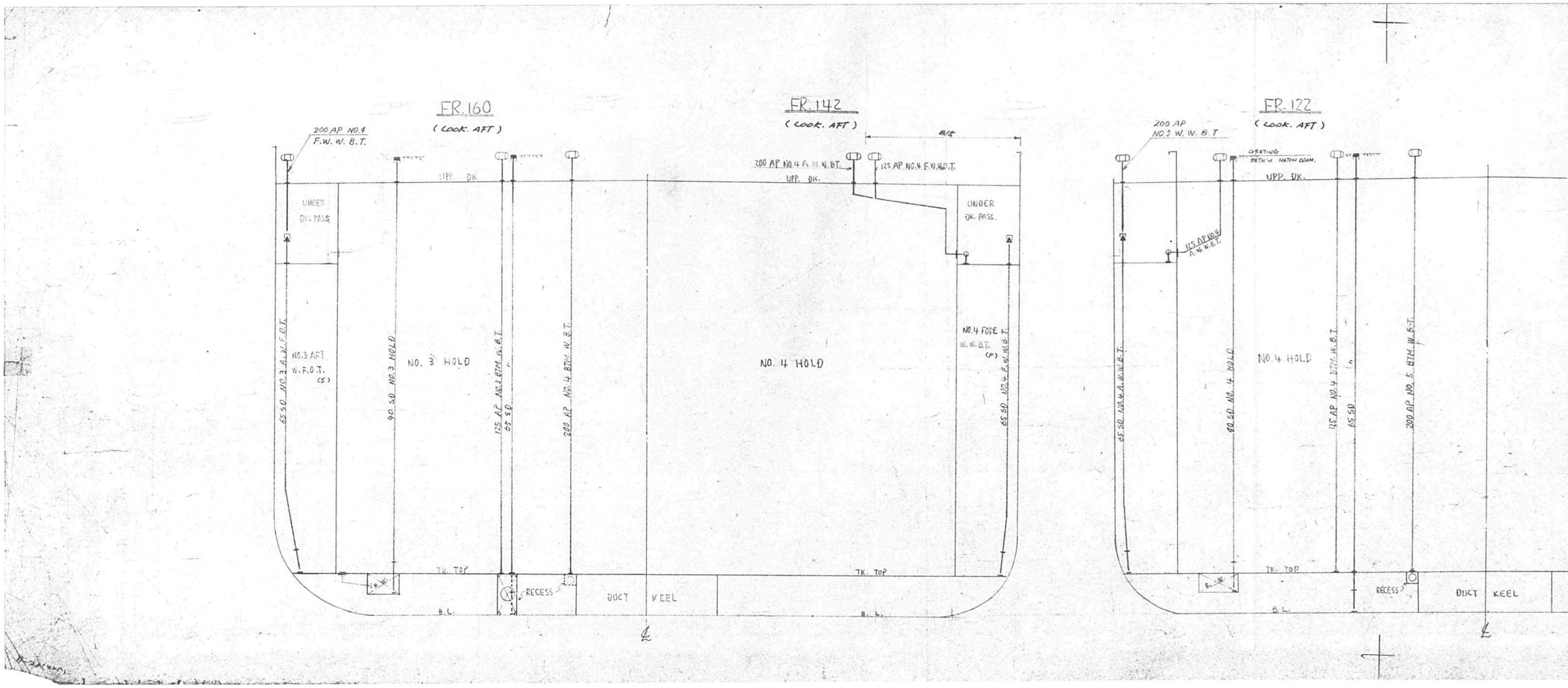
SHIP DESIGN DEPARTMENT	SHIP'S NO. TS1323/4/5	SHIP'S NAME
SEC. CHIEF	飲料水タンク液面計測用ペットコック取付要領	
ASSIST. CHIEF	INSTALLATION METHOD OF PET COCK FOR	
CHARGE ENG'R	LEVEL SOUNDING OF POT. WTR TK.	
STAFF		
DATE (TEL)		

JOB NO.	JOB CLASSIF. NO.	SCALE	DRAWING NO.
. . . . .	. .	1/30, ~	4116701 – 29/31



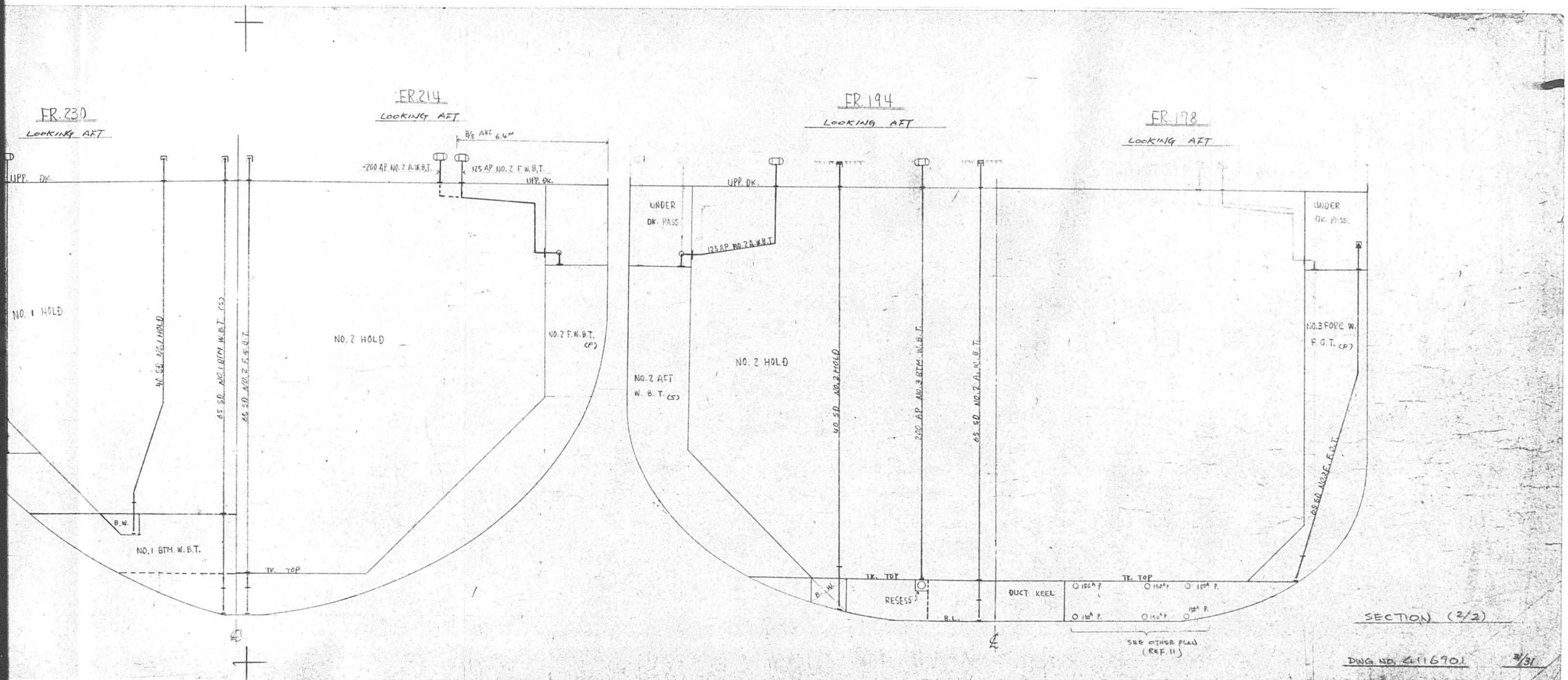
FR. 122
(LOOK. AFT)
FR. 103
(LOOK. AFT)
FR. 84
(LOOK. AFT)
UPP. DK.
NO.4 HOLD
NO.5 HOLD
NO.5 WING W.B.T. (P)
ANTI. HEEL T. (S)
UPPER DK. PASS.
125 AP NO.5 W. W.B.T.
200 AP ANTI. HEEL T.
250 AP ANTI. HEEL. TK.
TK. TOP
DUCT KEEL
RECESS
B.L.
SECTION (1/2)
DWG. NO. 4116701

1737

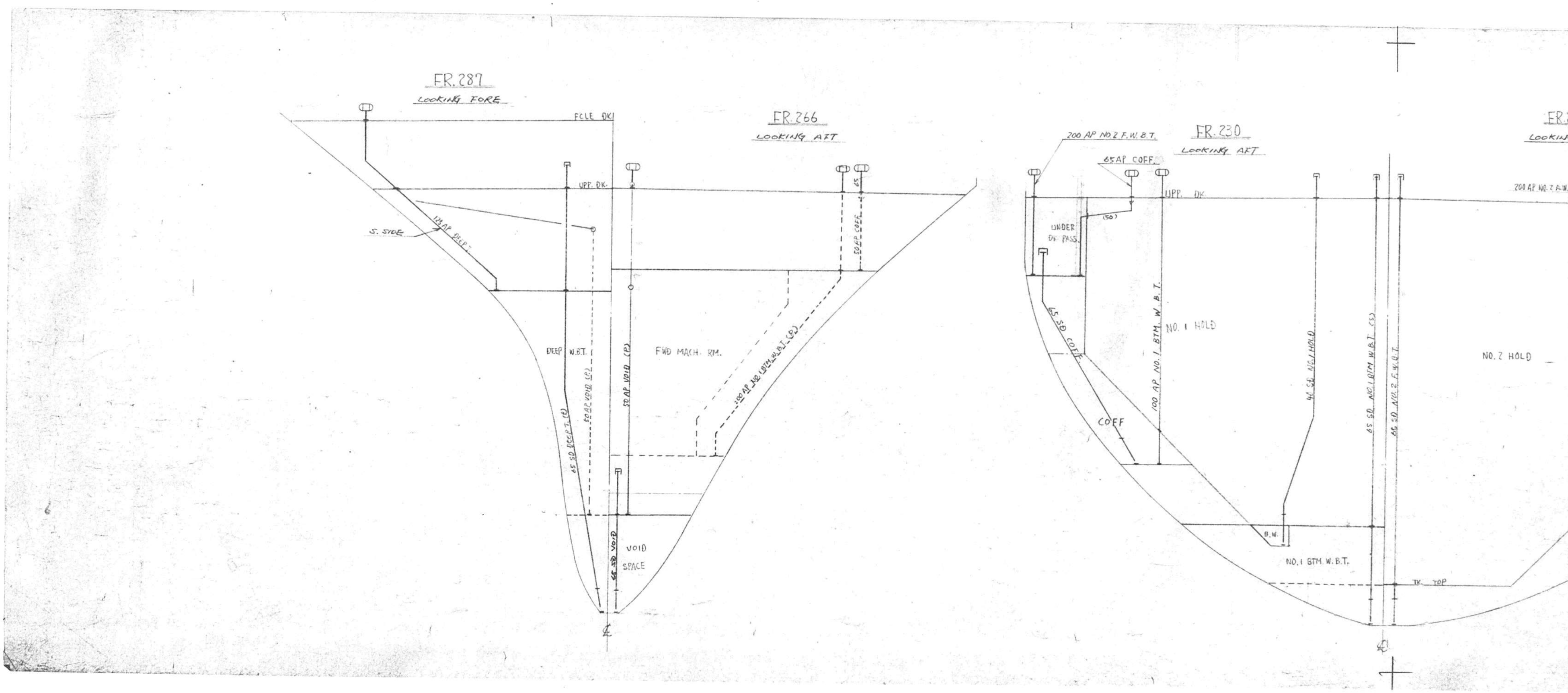


FR. 160
(LOOK. AFT)
200 AP NO.4 F.W.W.B.T.
UPP. DK.
UNDER DK. PASS.
NO. 3 HOLD
NO.3 AFT. W.F.O.T. (S)
TK. TOP
RECESS
DUCT KEEL
B.L.
FR. 142
(LOOK. AFT)
B/5
UPP. DK.
UNDER DK. PASS.
NO. 4 HOLD
NO.4 FORE W.W.B.T. (P)
TK. TOP
B.L.
FR. 122
(LOOK. AFT)
200 AP NO.3 W.W.B.T.
GRATING BET'N HATCH COAM.
UPP. DK.
NO.4 HOLD
TK. TOP
RECESS
DUCT KEEL
B.L.

2/2 1738


FR.230
LOOKING AFT
FR.214
LOOKING AFT
FR.194
LOOKING AFT
FR.178
LOOKING AFT
UPP. DK.
NO. 1 HOLD
NO. 2 HOLD
NO. 1 BTM W.B.T.
NO. 2 F.W.B.T. (P)
UNDER DK. PASS
NO. 2 AFT W.B.T. (S)
DUCT KEEL
RESESS
NO.3 FORE W. F.O.T. (P)
TK. TOP
B.W.
SEE OTHER PLAN (REF. 11)
SECTION (2/2)
DWG NO. G116701

1739



FR.287
LOOKING FORE
FCLE DK
UPP. DK
S. SIDE
DEEP W.B.T.
FWD MACH. RM.
VOID
SPACE
FR.266
LOOKING AFT
FR.230
LOOKING AFT
200 AP NO.2 F.W.B.T.
65AP COFF.
UPP. DK
UNDER
DK PASS
NO. 1 HOLD
NO. 2 HOLD
COFF
B.W.
NO.1 BTM W.B.T.
TK. TOP

2/2

1740

APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER		ABS			
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAR. 11 '85	OFFS/MES/166	APR. 17 '85	7-8-2		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME

MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — MANAGER: I. Tabuchi
OUTFIT DESIGN SECT (PIPING)
SHIP'S NAME: TILLIE LYKES

機関部
蒸気 および 排気管系図
STEAM & EXHAUST PIPING DIAGRAM IN ENGINE ROOM

LYKES REF. NO. 481001 — MITSUI DRAWING NO. 5131002 — REV.

(15 SHEETS WITH COVER)

5131002

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.No.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.No.1324 AND S.No.1325.	JUN. 26 '86

DWG.NO. 5131002

5131002

GENERAL NOTE

DWG.NO. 5131002

5131002

REFERENCE

NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480001	4116002	PIPING PRACTICE
	190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
	482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS
	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
	482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
	482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
	482608	5131205	GASKET (GENERAL USE)
	482604	5233111	CAST STEEL VALVES
	482606	5233112	FORGED STEEL VALVES
	482607	5233116	BRONZE VALVES

DWG.NO. 5131002

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S131002

REFERENCE			
NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480201	S131001	FEED & CONDENSATE PIPING DIAGRAM IN ENG. RM
	~~481001~~	~~S131002~~	~~STEAM AND EXHAUST PIPING DIAGRAM IN ENG. RM~~
	480802	S131008	STEAM DRAIN PIPING DIAGRAM IN ENG. RM
	481401	S131009	L.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481402	S131012	L.O. TRANSFER & PURIFICATION PIPING DIAGRAM IN ENG. RM
	481501	S131013	F.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481509	S131014	F.O. TRANSFER PIPING DIAGRAM IN ENG. RM
	481502	S131015	F.O. PURIFICATION PIPING DIAGRAM IN ENG. RM
	480403	S131016	COOLING F.W. PIPING DIAGRAM IN ENG. RM
	~~480501~~	~~S131018~~	COOLING S.W. & S.W. SERVICE PIPING ~~DIAGRAM IN ENG. RM~~
	~~480301~~	~~S131019~~	FIRE G.S. & BALLAST PIPING ~~DIAGRAM IN ENG. RM~~
	480102	S131020	BILGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENG. RM
	480401	S131023	F.W. SERVICE PIPING DIAGRAM IN ENG. RM
	481802	S131024	COMPRESSED AIR PIPING DIAGRAM IN ENG. RM
	481803	S131025	CONTROL AIR PIPING DIAGRAM IN ENG. RM
	~~481806~~	~~S131026~~	MAIN ENGINE REMOTE CONTROL AIR PIPING ~~DIAGRAM IN ENG. RM~~
	~~520001~~	~~S131030~~	~~EXHAUST GAS PIPING DIAGRAM IN ENG. RM~~
	481301	4116801	DIAGRAM OF HEATING COILS FOR FUEL OIL TANKS
	482411	5233201	AIR OPERATED AUTOMATIC CONTROL VALVES
	480402	4116401	DIAGRAM OF FRESH. HOT. POTABLE. SEA WATER & STEAM PIPE FOR ACCOMM. USE

DWG. NO. S131002

CODED GROUP SYSTEM OF PIPING DIAGRAM

管系 (SYSTEM) \ 区分 (DIVISION)	記号および番号 (DIVISION OF SYMBOL NUMBER) 管 (PIPE)	弁.コック.こし器 (VALVE, COCK)
蒸気(ボイラー圧)管系 BOILER PRESS. STEAM	1S-1 ~ 999	1SV-1 ~ 999
蒸気(減高圧)管系 HIGH REDUCED STEAM	2S-1 ~ 999	2SV-1 ~ 999
蒸気(減低圧)管系 LOW REDUCED STEAM	3S-1 ~ 999	3SV-1 ~ 999
過熱蒸気管系 SUPERHEATED STEAM	4S-1 ~ 999	4SV-1 ~ 999
タンク内加熱蒸気管系 TANK HEATING COIL	6S-1 ~ 999	——
排気管系 EXHAUST STEAM	1E-1 ~ 999	1EV-1 ~ 999
大気開放排気管系 ATMOS. EXHAUST STEAM	2E-1 ~ 999	2EV-1 ~ 999

S131002

MITSUI ENGINEERING & SHIPBUILDING CO., LTD.

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SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT :BUTT OR SOCKET WELDING ENDED :UNION ENDED
		GATE (SLUICE) VALVE	
		BUTTERFLY VALVE	
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	:LOCKED CLOSE :LOCKED OPEN
		SCREW DOWN CHECK VALVE	
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE;
		PRESS. REDUCING VALVE DIRECT OPERATING TYPE	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF. VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
COCK		TWO-WAY COCK	:LOCKED CLOSE :LOCKED OPEN
		THREE-WAY COCK	
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER :WITH POSITIONER :WITH MANUAL HANDLE
		PISTON TYPE (ON-OFF CONTROL)	
		PISTON TYPE (OPEN DEGREE CONTROL)	
		ELECTRIC MOTOR TYPE	
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS.-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	:WITH STOP VALVE :WITHOUT VALVE :WITH SELF CLOSING VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	
		FLAT GLASS LEVEL GAUGE	
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE; TANK
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	
		LEVEL INDICATOR	
		VISCOSITY INDICATOR	
		PRESSURE GAUGE	
		COMPOUND GAUGE	
		VACUUM GAUGE	
		DIFF. PRESS. GAUGE	
		THERMOMETER	
		REMOTE THERMOMETER	
		FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETECTOR		PRESSURE SWITCH	
		TEMPERATURE SWITCH	
		LEVEL (FLOAT) SWITCH	
		FLOW SWITCH	
		SALINITY CELL	
		ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
		MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

KIND	SYMBOL	NAME	REMARK
SAMPLE		---SYMBOL ---INSTRUMENT NO.	
INDICATOR		PRESSURE INDICATOR	
		VACUUM INDICATOR	
		COMPOUND INDICATOR	
		DIFF. PRESS. INDICATOR	
		TEMPERATURE INDICATOR	
		LEVEL INDICATOR	
		VISCOSITY INDICATOR	
		DENSITY INDICATOR	
		SALINITY INDICATOR	
		FLOW INDICATOR	
		OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL		PRESSURE CONTROL	
		TEMPERATURE CONTROL	
		LEVEL CONTROL	
		VISCOSITY CONTROL	
		AUTOMATIC CONTROL	
		EMER. SHUT DOWN	
		EMER. SLOW DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		AUTOMATIC START	
		AUTOMATIC STOP	
		AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM		HIGH PRESSURE ALARM	
		LOW PRESSURE ALARM	
		HIGH DIFF. PRESS. ALARM	
		HIGH TEMPERATURE ALARM	
		LOW TEMPERATURE ALARM	
		TEMP. DEVIATION HIGH ALARM	
		HIGH LEVEL ALARM	
		LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		HIGH VISCOSITY ALARM	
		LOW VISCOSITY ALARM	
		HIGH DENSITY ALARM	
		HIGH SALINITY ALARM	
		OVER FLOW ALARM	
		NON FLOW ALARM	
		GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131002

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
SUPERHEATED STEAM & IT'S DRAIN LINE (4S-1~20 / ~~4D-1~10~~)	200	8	216.3	8.2	SEAMLESS CARBON STEEL PIPE ABS-Gr4 SCH 40 (EQUIVALENT TO ASTM A106 GrA S)	JIS 30K (428 psi)	STEEL WELDED FLANGE WITH HUB FORGED STEEL PLATE ASTM A105 2" ø OVER	JIS 30K (428 psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT To ASTM A216 WC A or WCB)	DISC & SEAT; STAINLESS STEEL SCS13 JIS G 5121 (EQUIVALENT To ASTM A351 CF-8) STEM; STAINLESS STEEL SUS 304 JIS G4303 (EQUIVALENT To ASTM A276 TYPE 304)	JIS 30K (428 psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	265°C (509°F)	12.5K (178 psi)
	150	6	165.2	7.1										
	125	5	139.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7										
	32	1¼	42.7	3.6										
	25	1	34.0	3.4 (Sch 40)			STEEL ~~SLIP-ON~~ SOCKET FLANGE WITH HUB FORGED STEEL PLATE ASTM A105 (2½" / ½~2")	JIS 40K (568 psi)	FORGED STEEL FLANGED ASTM A105	DISC & STEM STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT To ASTM A276 TYPE 304)				
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	17.3	3.2 (Sch 80)		JIS 30K (428 psi)	FORGED STEEL GRIP JOINT SF50A (ASTM A 105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 40K (568 psi)	FORGED STEEL SCREWED ASTM A 105	DISC & STEM: STAINLESS STEEL SUS 304 JIS G4303 (EQUIVALENT To ASTM A276 TYPE 304)	JIS 30K (428 psi)	FORGED STEEL GRIP JOINT SF50A (ASTM A 105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)		
	6	¼	10.5	2.4										

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131002

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
TANK HEATING COIL (65-1~20)	50	2	60.5	5.5	WELDED CARBON STEEL PIPE STPG38E Sch80 JIS G3454 (EQUIVALENT To ASTM A53 GrA-E) NOTE [illegible] SHALL BE USED SEAMLESS PIPE	10K (143PSI)	SLEEVE JOINT STS38 JIS G3454 (EQUIVALENT TO ASTM A106 GrA-S)	—	—	—	—	—	170°C (338°F)	7K (100PSI)
	40	1½	48.6	5.1										
	25	1	34.0	4.5										

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131002

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
BOILER PRESSURE STEAM & IT'S DRAIN LINE (1S-1~80 / ~~1D-1~10~~)	200	8	216.3	8.2	SEAMLESS CARBON STEEL PIPE ABS-Gr4 SCH.40 (EQUIVALENT TO ASTM A106 GrA-S)	JIS 20K (285 psi) -	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL PLATE ASTM A105 2½" ø OVER	JIS 20K (285 psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT To ASTM A216 WC A or WCB)	DISC & SEAT; STAINLESS STEEL SCS13 JIS G 5121 (EQUIVALENT To ASTM A351 CF-8) STEM; STAINLESS STEEL SUS 304 JIS G4303 (EQUIVALENT To ASTM A276 TYPE 304)	JIS 20K (285 psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	193°C (380°F)	12.5K (178 psi)
	150	6	165.2	7.1										
	125	5	139.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7										
	32	1¼	42.7	3.6										
	25	1	34.0	3.4 (Sch 40)			STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL PLATE ASTM A105		FORGED STEEL FLANGED ASTM A105	DISC & STEM STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)				
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	17.3	3.2 (Sch 80)		JIS 30K (428 psi)	FORGED STEEL GPIP JOINT SF50A (ASTM A 105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 20K (285 psi)	FORGED STEEL SCREWED ASTM A 105	DISC & STEM: STAINLESS STEEL SUS 304 JIS G4303 (EQUIVALENT To ASTM A276 TYPE 304)	JIS 30K (428 psi)	FORGED STEEL GRIP JOINT SF50A (ASTM A 105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)		
	6	¼	10.5	2.4										

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131002

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
5.7K & 3K STEAM IT'S DRAIN LINE (2S-1~100 / ~~2D-1~20~~ / 3S-1~100 / ~~3D-1~10~~)	250	10	267.4	9.3										
	200	8	216.3	8.2	WELDED CARBON STEEL PIPE STPG 38E Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA-E)	JIS 10K (143 psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT To ASTM A 36)	JIS 10K (143 psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WC A or WCB)	DISC & SEAT SUS FACED ON CAST STEEL OR STAINLESS STEEL SCS 13 JIS G 5121 (EQUIV. TO ASTM A351 CF8) STEM; STAINLESS STEEL SUS 304 JIS G4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143 psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	183~138°C (361~280°F)	10~2.5K (143~36 psi)
	150	6	165.2	7.1										
	125	5	139.8	6.6										
STEAM TRAP OUTLET LINE (5D-1~90)	100	4	114.3	6.0										
	80	3	89.1	5.5									150°C (302°F)	1K (14 psi)
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7			FORGED STEEL WITH HUB ASTM A105 250A & ABOVE	JIS 16K (228 psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC; BC6 (ASTM B62) STEM; SUS 304 (ASTM A276 TP304)				
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMLESS DRAWN COPPER PIPE C1220T-0 JIS H 3300 (EQUIVALENT TO ASTM B88 C12200)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNS C 46400) OR BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	JIS 20K (285 psi)	CAST BRONZE FLARED BC6 JIS H5111 (EQUIVALENT To ASTM B62)	DISC & STEM STAINLESS ST. SUS 304 JIS G4303 (EQUIVALENT TO ASTM A276 TYPE 304)		NAVAL BRASS FLARED JOINT C4641B JIS H 3250 (EQUIVALENT TO ASTM B21 UNS C 46400) OR BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	50°C (122°F)	0K
	6	¼	8.0	1.2										

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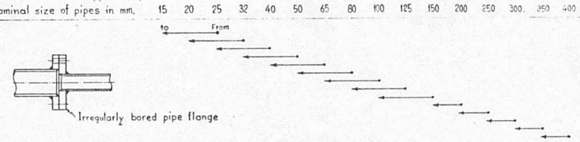
Reducing method of pipe diameter

In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

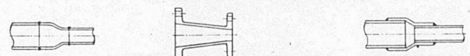
1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the difference of pipe size is within the following limits. → Irregulaly bored pipe flanges shall only be used for vent piping, air piping and scupper pipe line.

Nominal size of pipes in mm. 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400

to from



2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.



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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131002

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
EXHAUST STEAM LINE (1E-1~20)	600	24	609.6	9.5	ARC WELDED CARBON STEEL PIPE STPY41 STD JIS G 3457 (EQUIVALENT TO ASTM A134 (A285A)) 450A & ABOVE	JIS10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL ASTM A 105 or BUTT WELDING; 10" & ABOVE	JIS10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT; SUS FACED ON CAST STEEL OR STAINLESS STEEL SCS13 JIS G 5121 (EQUIV. TO ASTM A351 CF8) STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	100°C (212°F)	1K (14psi)
	500	20	508.0	9.5										
	400	16	406.4	9.5										
	350	14	355.6	9.5										
	300	12	318.5	9.5										
	250	10	267.4	9.3										
	200	8	216.3	8.2										
	150	6	165.2	7.1										
ATMOS. EXHAUST STEAM LINE (2E-1~50)	125	5	139.8	6.6										0K
	100	4	114.3	6.0										
	80	3	89.1	5.5	WELDED CARBON STEEL PIPE STPG 38E JIS G 3454 (EQUIVALENT TO ASTM A53 GrA)	JIS10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)							
	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7				JIS16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC; BC6 (ASTM B62) STEM; SUS 304 (ASTM A276 TP304)				
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
	10	⅜	15.0	1.6	SEAMRESS DRAWN COPPER PIPE C1220T-O JIS H 3300 (EQUIVALENT TO ASTM B88 C12200)		NAVAL BRASS FLARED JOINT C4641B JIS H3250 (EQUIVALENT TO ASTM B21 UNSC 46400) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	JIS20K (285psi)	CAST BRONZE FLARED BC6 JIS H 5111 (EQUIVALENT TO ASTM B62)	DISC & STEM; STAINLESS ST. SUS 304 JIS G4303 (EQUIVALENT TO ASTM A276 TYPE 304)		NAVAL BRASS FLARED JOINT C4641B JIS H3250 EQUIVALENT TO ASTM B21 UNSC 46400 OR BC6 JIS H5111 EQUIVALENT TO ASTM B62		
	6	¼	8.0	1.2										

(STD. for 600–300; SCH 40 for 250–15)

5131002

5131002

SLEEVE JOINT

According to the yard's standard practice, Welding sleeve joints may be used with the limitation as mentioned hereafter.

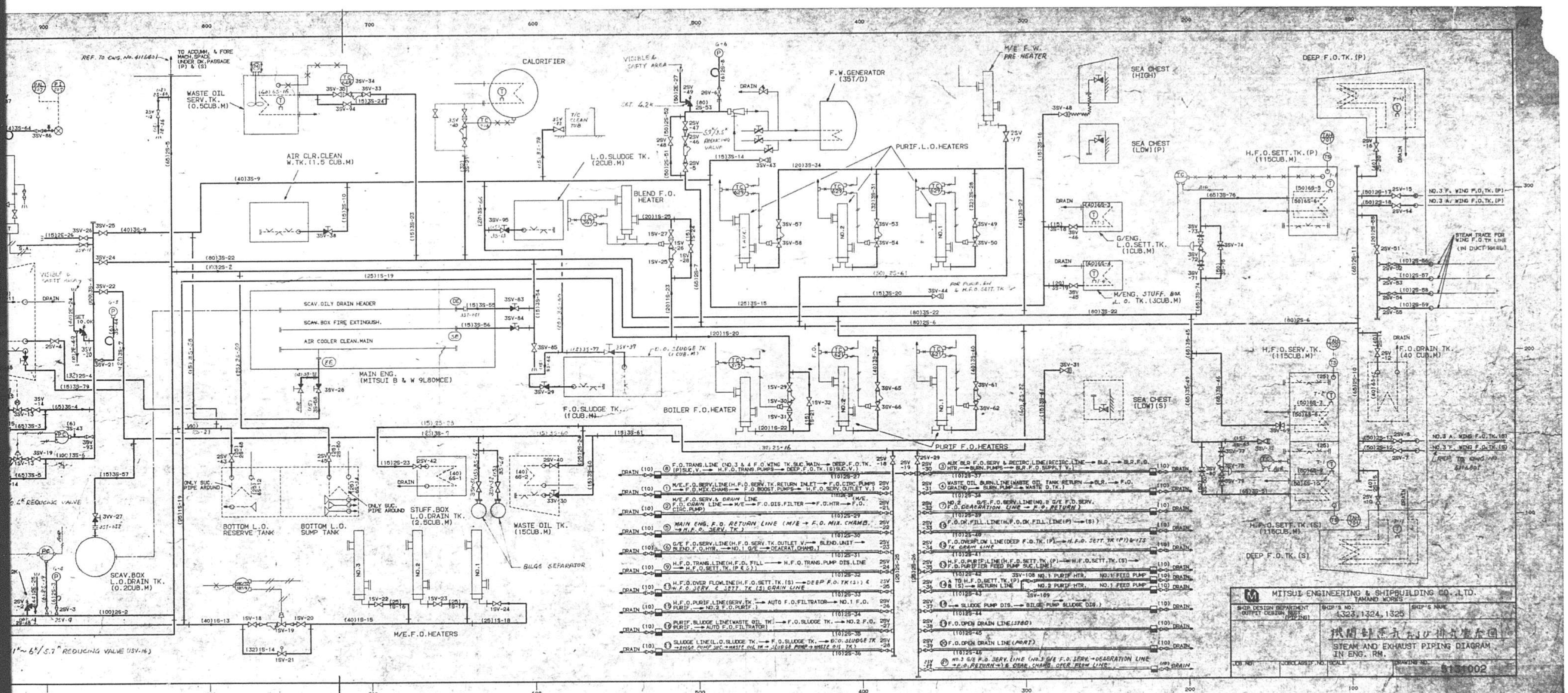
1 Piping system to be applied

Exhaust steam line (1E, 2E)
Steam drain line (5D)
~~Exhaust gas line~~
~~Condensate water line~~

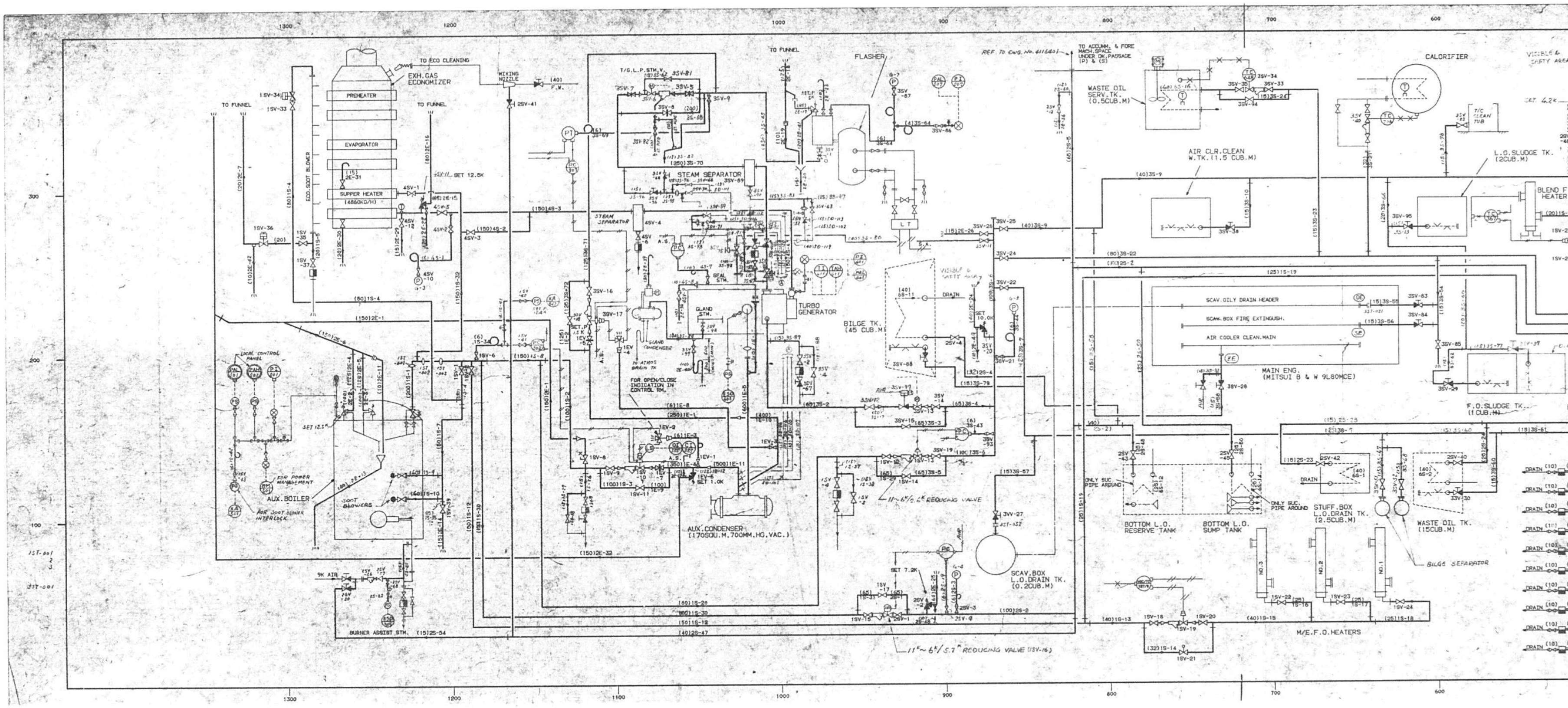
All air vent line
All open ended drain line
~~Open bilge scupper line~~

2 Nominal diameter of the pipe
15 mm & over

1745


CALORIFIER
F.W.GENERATOR (35T/D)
M/E F.W. PRE HEATER
SEA CHEST (HIGH)
SEA CHEST (LOW)(P)
SEA CHEST (LOW)(S)
DEEP F.O.TK.(P)
H.F.O.SETT.TK.(P) (115CUB.M)
WASTE OIL SERV.TK. (0.5CUB.M)
AIR CLR.CLEAN W.TK.(1.5 CUB.M)
L.O.SLUDGE TK. (2CUB.M)
BLEND F.O. HEATER
PURIF.L.O.HEATERS
G/ENG. L.O.SETT.TK. (1CUB.M)
M/ENG. STUFF. BOX L.O. TK.(3CUB.M)
SCAV.OILY DRAIN HEADER
SCAV.BOX FIRE EXTINGUISH.
AIR COOLER CLEAN.MAIN
MAIN ENG. (MITSUI B & W 9L80MCE)
F.O.SLUDGE TK. (1CUB.M)
BOILER F.O.HEATER
PURIF F.O.HEATERS
H.F.O.SERV.TK. (115CUB.M)
F.O.DRAIN TK. (40 CUB.M)
BOTTOM L.O. RESERVE TANK
BOTTOM L.O. SUMP TANK
STUFF.BOX L.O.DRAIN TK. (2.5CUB.M)
WASTE OIL TK. (15CUB.M)
BILGE SEPARATOR
SCAV.BOX L.O.DRAIN TK. (0.2CUB.M)
M/E.F.O.HEATERS
H.F.O.SETT.TK.(S) (115CUB.M)
DEEP F.O.TK.(S)
MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT
OUTFIT DESIGN SECT. (PIPING)
SHIP'S NO. 1323,1324,1325
SHIP'S NAME
STEAM AND EXHAUST PIPING DIAGRAM
IN ENG. RM.
JOB NO.
JOBCLASSIF.NO.
SCALE
DRAWING NO.
5131002

1/2 1746



TO ECO CLEANING
EXH.GAS ECONOMIZER
PREHEATER
EVAPORATOR
SUPPER HEATER (4860KG/H)
TO FUNNEL
MIXING NOZZLE
T/G.L.P.STM.V.
STEAM SEPARATOR
FLASHER
TURBO GENERATOR
GLAND STM.
BILGE TK. (45 CUB.M)
AUX.BOILER
AUX.CONDENSER (170SQU.M.700MM.HG.VAC.)
BURNER ASSIST STM.
SCAV.BOX L.O.DRAIN TK. (0.2CUB.M)
WASTE OIL SERV.TK. (0.5CUB.M)
AIR CLR.CLEAN W.TK.(1.5 CUB.M)
CALORIFIER
L.O.SLUDGE TK. (2CUB.M)
BLEND F.O. HEATER
SCAV.OILY DRAIN HEADER
SCAV.BOX FIRE EXTINGUISH.
AIR COOLER CLEAN.MAIN
MAIN ENG. (MITSUI B & W 9L80MCE)
F.O.SLUDGE TK. (1CUB.M)
BOTTOM L.O. RESERVE TANK
BOTTOM L.O. SUMP TANK
STUFF.BOX L.O.DRAIN TK. (2.5CUB.M)
WASTE OIL TK. (15CUB.M)
BILGE SEPARATOR
M/E.F.O.HEATERS

APPROVAL OF OWNER & REGULATORY BODIES

ALT.NO.	OWNER DATE	OWNER LETTER NO.	USCG DATE	USCG LETTER NO.	ABS DATE	ABS LETTER NO.	USPH DATE	USPH LETTER NO.
ORIGINAL	7 Feb '86	OFTS/MES/6173			24 Feb '86	T-8-2		
△1	29 May '86	OFTS/MES-6794			11 Jul '86	T-8-2		
△2	—	—			—	—		

FINISHEDPLAN

SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT MANAGER | SHIP'S NO. | SHIP'S NAME: TILLIE LYKES

OUTFIT. DESIGN SEC.(PIPING) SEC.CHIEF

燃料油艙加熱管系統図

DIAGRAM OF HEATING COILS FOR FUEL OIL TANKS

DATE (TEL 2240)

JOB NO. TS1323/24/25 | SCALE 1/200 | LYKES REF. NO. 481301 | MITSUI DRAWING NO. 4116801

JOBCLASSIF.NO. D.16.08

(11 SHEETS WITH COVER)

1/11

PLAN RECORD

ALT.NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.1324 AND S.1325.	June. 27,'86

DWG.NO. 4116801 2/11

GENERAL NOTE

1. STEAM SUPPLY, DRAIN RETURN AND STEAM TRACE PIPES FOR F.O. SUC. & FILL. LINES IN DUCT KEEL & CARGO HOLDS SHALL BE INSULATED EXCEPT WHERE PIPE SUPPORTS ARE FITTED.
2. MAX. WORKING PRESURE : 7.2 kg/cm²
3. SUITABLE NUMBER OF OFFSET BENDS SHALL BE PROVIDED.
4. OWNER'S REQUIREMENTS IN DISCUSSION MEMORANDUM OF HULL OUTFITTING, ITEM 32 (PAGE 236 TO 240), DATED 16th To 23rd '85 HAVE BEEN INCLUEDED.

DWG.NO. 4116801 3/11

REFERENCE

NO.	REF. NO. MES	REF. NO. LIKES	DWG. NO.	DWG. NAME
1		480001	4116002	PIPING PRACTICE
2		190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
3		482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
4		482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
5		482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS
6		482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
7		482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
8		482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
9		482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
10		482608	5131205	GASKET (GENERAL USE)
11		482413	5233212	STEAM TRAP
12		480101	4116201	DIAGRAM OF BILGE, BALL. & F.O. LINES.
13		481001	5131002	STEAM & EXH. PIPING DIAGRAM IN ENG. RM.
14		481509	5131014	F.O. TRANSF. PIPING DIAGRAM IN ENG. RM.
15		482407	5233114	BRONZE VALVE
16		550302	4116803	CALCULATION SHEET FOR HEATING COILS IN NO.3 F.O. TKS & DEEP F.O. TKS
17				
18				
19				
20				

DWG.NO. 4116801 4/11

2/2

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DWG.NO. 4116801 1/4

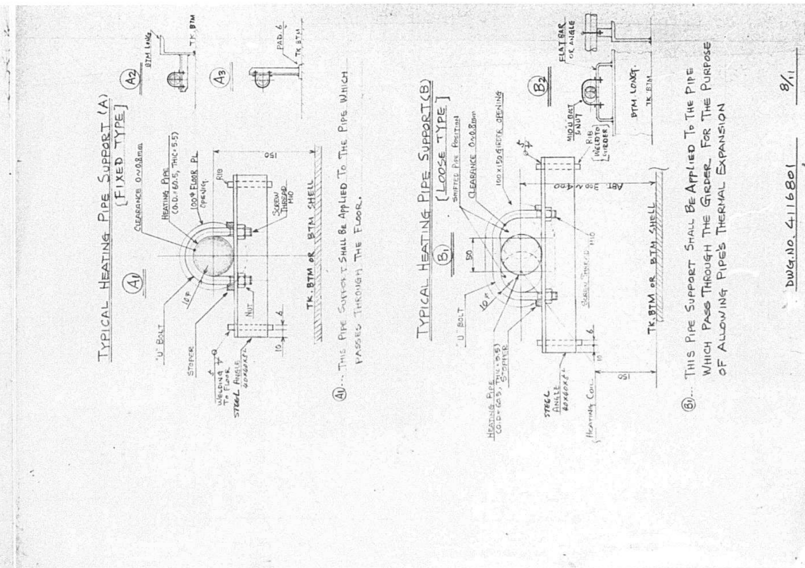
FITTING LIST (1/1)

SYMBOL	TYPE	SERVICE	PRESS. RATE (KG/CM²)	MAX. WORK. PRESS. (KG/CM²)	WORK. TEMP. (°C)	MATERIAL BODY	MATERIAL STEM	MATERIAL DISC	NOM. DIA. MM	NOM. DIA. INCH	QTY.	LIST NO.	REMARKS DETEIL DWG
[steam trap symbol]	STEAM TRAP WITH DRAIN VALVE	STEAM & DRAIN	10	4	151	REFER TO OTHER DWG. (REF. 11)			32	1¼	4	HSV-1~4	SEE REF. 11 4/9 4216811
[valve symbol]	SCREW DOWN STOP CHECK VALVE					CAST BRONZE BC6 JIS H5111 [EQUIV. TO ASTM B62]	STAINLESS ST. SUS 304 JIS G4303 [EQUIV. TO ASTM A276 TYPE 304]	CAST BRONZE BC6 JIS H5111 [EQUIV. TO ASTM B62]	32	1¼	4	HRV-1~4	SEE REF. 15 4/9 4216813

DWG.NO. 4116801 1/5

PIPING LIST (1/1)

SYSTEM (SERVICE)		MAX. WORK. PRESS. (KG/CM²)	WORK. TEMP. (°C)	HYD. TEST PRESS. (KG/CM²)	PIPE MATERIAL		LIST NO. STANDARD	AS. END	NOM. DIA. MM	NOM. DIA. INCH	OUT. DIA. (MM)	THICK (MM)	SCH. NO.	JOINT PRESS. STD.	JOINT TYPE	JOINT MATERIAL	USCG PIPING CLASS	AB PIPING CLASS
HEATING COIL	IN F.O. TK	7.2	MAX. 171	SAME AS MAX. WORK. PRESS. (ONLY AFTER INSTALL. ON BOARD.)	WELDED CARBON STEEL PIPE STPG38-E JIS G3454 [EQUIV. TO ASTM A53 GR. A-E]	NOT GALVANIZED	HS-20-39	25	50	2	60.5	5.5	80	10K	WELDED SLEEVE [SEE REF. 4]	SLEEVE; STS38-S JIS G3455 [EQUIV. TO ASTM A106 GR. A] FLANGE; ASTM A36	II	II
							〃-40-59	41	40	1½	48.6	5.1	〃					
							〃-60-79	63	32	1¼	42.7	4.9	〃					
							- -											
STEAM SUPPLY PIPE	IN DUCT KEEL & CARGO HOLD.						HS-220-239	223	50	2	60.5	5.5	80		WELDED SLEEVE (IN GENERAL) & SLIP-ON FLANGE [SEE REF. 4]			
							- -											
DRAIN RETURN PIPE		4.0	MAX. 151				- -											
							HR-260-279	263	32	1¼	42.7	4.9	〃					
							〃-280-299	283	25	1	34.0	4.5	〃					
STEAM TRACE PIPE FOR F.O. PIPE		7.2	MAX. 171		SEAMLESS DRAWN COPPER PIPE C1220 T-O JIS H 3300 [EQUIVALENT TO ASTM B88 C12200]		HS-140-159	145	10	3/8	15.0	1.6	-		SOCKET BRAZING UNION. (SEE REF. 6)	CAST BRONZE BC6 JIS H 5111 [EQUIV. TO ASTM B62]		
							- -								COPPER PIPE JOINTS SEE PAGE 14~18 (SEE REF. 6)	SEAMLESS DRAWN COPPER PIPE C1220 T-O JIS H 3300 [EQUIV. TO ASTM B88 C12200]		
							- -								OR FLARE TYPE JOINTS SEE PAGE 82~87 (SEE REF. 6)	NAVAL BRASS JIS H 3250 [EQUIV. TO ASTM B21]		
							- -											
							- -											
							- -											
							- -											
							- -											
							- -											



DWG.NO. 4116801 7/1

CALCULATION OF HEATING COILS

(REFER TO REF. 16)

TANK		VOLUME (M³)	RATIO (M²/M³)	HEAT. AREA REQ. (M²)	PIPE HEAT. AREA (M²/M)	PIPE LENGTH (M)	PIPE AREA (M²)	REMARKS
NO.3 FORE WING F.O. TK.	P	505	0.04	20.2	0.190	107	20.3	
	S	505		20.2		107	20.3	
NO.3 AFT WING F.O. TK.	P	540		21.6		114	21.7	
	S	540		21.6		114	21.7	
DEEP F.O. TK	P	475		19.0		100	19.0	
	S	535		21.4		113	21.5	

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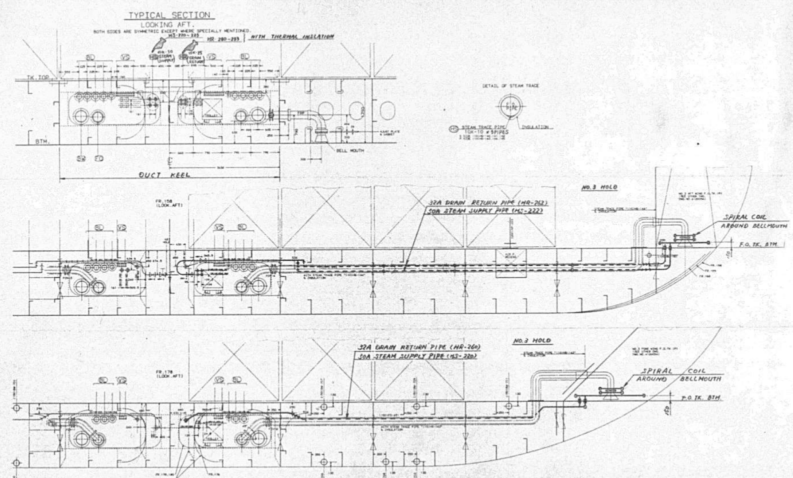
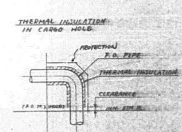
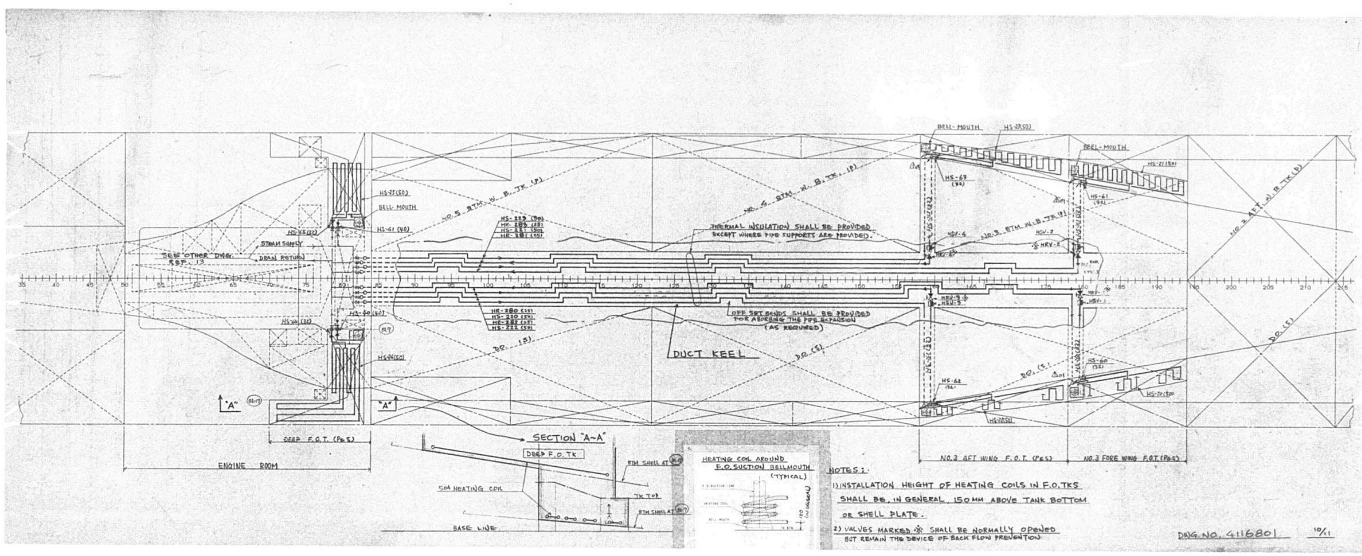
PIPE LIST		
MARK	NAME	REFERENCE DWG. NO.
AP	AIR PIPE	4116701
BL	BILGE	4116201
BW	BALLAST	4116201
CA	COMPRESSED AIR	4117401
CO	CO2 FIRE EXT.	4119101
EP	PROTECT.P.FOR EL.CABLE	
FO	FUEL OIL	4116201
FW	FRESH WATER	4116401
HS	FUEL OIL HEATING(SUPPLY)	4116801
HR	FUEL OIL HEATING(EXH'T)	4116801
MS	HYD.OIL SUPP.(DK.MACH.)	4101401
MR	HYD.OIL RET.(DK.MACH.)	4101401
PN	PNEUMACATOR PIPE	4116705
SC	SCUPPER	4116601
SD	SOUNDING	4116701
VS	VALVE REMOTE CONT.(SUPPLY)	4116301
VR	VALVE REMOTE CONT.(RETURN)	4116301
WD	FIRE & WASH DK.	4116101
FC	CETRAL CLEAN. SYSTEM	4116105
GS	GENERAL SERV. STEAM	4116401
GR	GENERAL SERV. STEAM DRAIN	4116401
2A	COMPRESSED AIR	5131024
2C	CONTROL AIR	5131025

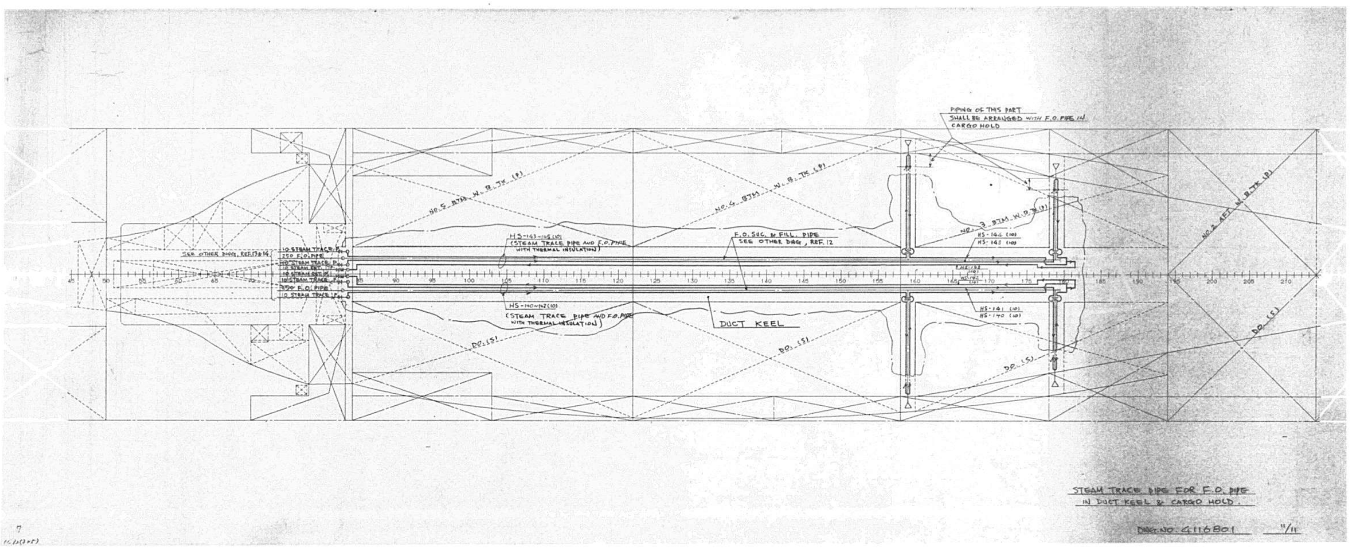




1750


SECTION "A~A"
DUCT KEEL
ENGINE ROOM
DEEP F.O.T. (P&S)
NO.2 AFT WING F.O.T. (P&S)
NOTES:
1) INSTALLATION HEIGHT OF HEATING COILS IN F.O.TKS SHALL BE, IN GENERAL, 150MM ABOVE TANK BOTTOM OR SHELL PLATE.
2) VALVES MARKED ※ SHALL BE NORMALLY OPENED
DWG.NO. 4116801

1751


PIPING OF THIS PART SHALL BE ARRANGED WITH F.O. PIPE IN CARGO HOLD
DUCT KEEL
STEAM TRACE PIPE FOR F.O. PIPE
IN DUCT KEEL & CARGO HOLD.
DWG. NO. G116801
11/11

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APPROVAL OF OWNER & REGULATORY BODIES

ALT. NO.	OWNER DATE	OWNER LETTER NO.	ABS DATE	ABS LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAR. 12 '85		APR. 17 '85	7-8-2		
REV. 1			AUG. 12 '85	1-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT — SHIP'S NAME: TILLIE LYKES

機関部
潤滑油サービス管系図

L.O. SERVICE PIPING DIAGRAM
IN ENGNE ROOM

LYKES REF. NO. 481401 — MITSUI DRAWING NO. 5131009 — REV.

(13 SHEETS WITH COVER)

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.No.1323 AS FINISHED PLAN, MADE APPLICABLE TO S.No.1324 AND S.No.1325.	JUN. 26 '86

DWG.NO. 5131009 — 1

GENERAL NOTE

DWG.NO. 5131009 — 2

REFERENCE

NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480001	4116002	PIPING PRACTICE
	190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
	482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS
	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
	482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
	482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
	482608	5131205	GASKET (GENERAL USE)
	482404	5233111	CAST STEEL VALVES
	482406	5233112	FORGED STEEL VALVES
	482607	5233114	BRONZE VALVES

DWG.NO. 5131009 — 3

1753

REFERENCE			
NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480201	S131001	FEED & CONDENSATE PIPING DIAGRAM IN ENG. RM
	481001	S131002	STEAM AND EXHAUST PIPING DIAGRAM IN ENG. RM
	480802	S131008	STEAM DRAIN PIPING DIAGRAM IN ENG. RM
	481401	S131009	L.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481402	S131012	L.O. TRANSFER & PURIFICATION PIPING DIAGRAM IN ENG. RM
	481501	S131013	F.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481509	S131014	F.O. TRANSFER PIPING DIAGRAM IN ENG. RM
	481502	S131015	F.O. PURIFICATION PIPING DIAGRAM IN ENG. RM
	480403	S131016	COOLING F.W. PIPING DIAGRAM IN ENG. RM
	480501	S131018	COOLING S.W. & S.W. SERVICE PIPING DIAGRAM IN ENG. RM
	480301	S131019	FIRE G.S. & BALLAST PIPING DIAGRAM IN ENG. RM
	480102	S131020	BILGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENG. RM
	480401	S131023	F.W. SERVICE PIPING DIAGRAM IN ENG. RM
	481802	S131024	COMPRESSED AIR PIPING DIAGRAM IN ENG. RM
	481803	S131025	CONTROL AIR PIPING DIAGRAM IN ENG. RM
	481806	S131026	MAIN ENGINE REMOTE CONTROL AIR PIPING DIAGRAM IN ENG. RM
	520001	S131030	EXHAUST GAS PIPING DIAGRAM IN ENG. RM

S131009

CODED GROUP SYSTEM OF PIPING DIAGRAM

区分 (DIVISION) / 管系 (SYSTEM)	記号および番号 (DIVISION OF SYMBOL NUMBER) 管 (PIPE)	弁.コック.こし器 (VALVE, COCK)
潤滑油 サービス管系		
L.O. SERVICE PIPING	1L-1~100	1LV-1~100
船尾管潤滑油管系		
STERN TUBE L.O. PIPING	4L-1~100	4LV-1~100
大気開放トレン, 空気抜管系		
ATMOS DRAIN & AIR VENT PIPING	7L-1~200	7LV-1~200

SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT
		GATE (SLUICE) VALVE	:BUTT OR SOCKET WELDING ENDED
		BUTTERFLY VALVE	:UNION ENDED
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	:LOCKED CLOSE
		SCREW DOWN CHECK VALVE	:LOCKED OPEN
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE;
		PRESS. REDUCING VALVE DIRECT OPERATING TYPE	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
COCK		TWO-WAY COCK	:LOCKED CLOSE
		THREE-WAY COCK	:LOCKED OPEN
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER
		PISTON TYPE (ON-OFF CONTROL)	:WITH POSITIONER
		PISTON TYPE (OPEN DEGREE CONTROL)	:WITH MANUAL HANDLE
		ELECTRIC MOTOR TYPE	
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	● :WITH STOP VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	○ :WITHOUT VALVE
		FLAT GLASS LEVEL GAUGE	:WITH SELF CLOSING VALVE
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE:
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	TANK
	L	LEVEL INDICATOR	
	VS	VISCOSITY INDICATOR	
	P	PRESSURE GAUGE	
	C	COMPOUND GAUGE	
	V	VACUUM GAUGE	
	Pd	DIFF. PRESS. GAUGE	
	T	THERMOMETER	
	T	REMOTE THERMOMETER	
	F	FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETECTOR	PS	PRESSURE SWITCH	
	TS	TEMPERATURE SWITCH	
	LS	LEVEL (FLOAT) SWITCH	
	FS	FLOW SWITCH	
	SC	SALINITY CELL	
		ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
	MS	MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

KIND	SYMBOL	NAME	REMARK
SAMPLE		---SYMBOL ---INSTRUMENT NO.	
INDICATOR	PI	PRESSURE INDICATOR	
	VI	VACUUM INDICATOR	
	CI	COMPOUND INDICATOR	
	PdI	DIFF. PRESS. INDICATOR	
	TI	TEMPERATURE INDICATOR	
	LI	LEVEL INDICATOR	
	VSI	VISCOSITY INDICATOR	
	DI	DENSITY INDICATOR	
		SALINITY INDICATOR	
	FI	FLOW INDICATOR	
	XI	OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL	PC	PRESSURE CONTROL	
	TC	TEMPERATURE CONTROL	
	LC	LEVEL CONTROL	
	VSC	VISCOSITY CONTROL	
	AC	AUTOMATIC CONTROL	
	ESD	EMER. SHUT DOWN	
	ESLD	EMER. SLOW DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
	AST	AUTOMATIC START	
	ASP	AUTOMATIC STOP	
	ASR	AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM	PAH	HIGH PRESSURE ALARM	
	PAL	LOW PRESSURE ALARM	
	PdAH	HIGH DIFF. PRESS. ALARM	
	TAH	HIGH TEMPERATURE ALARM	
	TAL	LOW TEMPERATURE ALARM	
	TdAH	TEMP. DEVIATION HIGH ALARM	
	LAH	HIGH LEVEL ALARM	
	LAL	LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
		HIGH VISCOSITY ALARM	
		LOW VISCOSITY ALARM	
		HIGH DENSITY ALARM	
		HIGH SALINITY ALARM	
		OVER FLOW ALARM	
	FAL	NON FLOW ALARM	
	XA	GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

5131009

1755

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131009

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
STERN TUBE L.O PUMP SUC. & RETURN LINE PARKERIZING (4L-1~30)	400 350 300 250	16 14 12 10	406.4 355.6 318.5 267.4	9.5 9.5 9.5 9.3 (STD)	SEAMLESS CARBON STEEL PIPE STPG 38S JIS G 3454 (EQUIVALENT TO ASTM A53 GrA.S)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL ASTM A 105 or BUTT WELDING 10" & OVER	JIS 10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT; SUS FACED ON CAST STEEL OR STAINLESS STEEL SCS13 JIS G 5121 (EQUIV. TO ASTM A351 CF8) STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	55°C (131°F)	1K (14psi)
STERN TUBE L.O PUMP DIS. LINE PARKERIZING (4L-31~100)	200 150 125 100 80 65 50	8 6 5 4 3 2½ 2	216.3 165.2 139.8 114.3 89.1 76.3 60.5	8.2 7.1 6.6 6.0 5.5 5.2 3.9 (Sch 40)		JIS 10K (143Psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)						45°C (113°F)	3K (43psi)
L.O. PURIFIED LINE (PUMP SUC.) PARKERIZING (5L-1~ 0)	40 32	1½ 1¼	48.6 42.7	3.7 3.6				JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC; BC6 JIS H5111 (EQUIV. TO ASTM B62) STEM: SUS304 (EQUIV. TO ASTM A276 Tp304)			45°C (113°F)	1K (14psi)
L.O. PURIFIED LINE (FEED PUMP DIS. TO HEATER) PARKERIZING (5L-31~60)	25 20 15	1 ¾ ½	34.0 27.2 21.7	3.4 2.9 2.8									45°C (113°F)	3K (43psi)
L.O. PURIFIER HEATER OUTLET PARKERIZING (5L-81~110)	10 6	⅜ ¼	17.3 10.5	3.2 2.4 (SCH 80)		JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50 A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 20K (285psi)	FORGED STEEL ASTM A105	STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A182 Gr F 304)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50 A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	95°C (203°F)	3K (43psi)

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131009

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
HULL L.O. TANK AIR VENT LINE (IN ENGINE ROOM) (7L-131~150) L.O. TANK SOUNDING LINE (ON EXPOSED DK) (6L-11~20)	150 125 100 80 65 50	6 5 4 3 2½ 2	165.2 139.8 114.3 89.1 76.3 60.5	7.1 6.6 6.0 5.5 5.2 (Sch 40) 5.5 (Sch 80)	WELDED CARBON STEEL PIPE STPG38-E JIS G 3454 (EQUIVALENT TO ASTM A53 GrA-E)	10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)	JIS 10K (143psi)	SOUNDING HEAD; CAST BRONZE BC6 JIS H 5111 (EQUIVALENT TO ASTM B62) AIR VENT HEAD; DUCTILE CAST IRON FCD 45 JIS G 5502 (EQUIVALENT TO ASTM A395)	—	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	45°C (113°F)	1K (14psi)
HULL L.O. TANK AIR VENT LINE (ON EXPOSED DK.) GALVANIZED (7L-151~160)	150 125 100 80 65 50	6 5 4 3 2½ 2	165.2 139.8 114.3 89.1 76.3 60.5	11.0 9.5 8.6 7.6 7.0 5.5	WELDED CARBON STEEL PIPE STPG 38-E (Sch 80) JIS G 3454 (EQUIVALENT TO ASTM A53 GrA·E)									

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131009

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
MAIN L.O. PUMP & OTHER PUMP SUC. & RETURN LINE PARKERIZING (1L-1~30)	400 350 300	16 14 12	406.4 355.6 318.5	9.5 9.5 9.5 (STD)	SEAMLESS CARBON STEEL PIPE STPG 38 S JIS G 3454 (EQUIVALENT TO ASTM A53-GrA S)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL ASTM A105 or BUTT WELDING 10" & OVER	JIS 10K (143psi)	CAST STEEL FLANGED SC 46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT; SUS FACED ON CAST STEEL OR STAINLESS STEEL SCS13 JIS G (EQUIV. TO ASTM A351 CF8) STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	55°C (131°F)	1K (14psi)
MAIN L.O. PUMP & D/G PRIMING L.O. PUMP DIS. LINE CAM SHAFT L.O. PUMP DIS. LINE PARKERIZING (1L-31~120)	250 200 150 125 100 80 65 50 40 32	10 8 6 5 4 3 2½ 2 1½ 1¼	267.4 216.3 165.2 139.8 114.3 89.1 76.3 60.5 48.6 42.7	9.3 8.2 7.1 6.6 6.0 5.5 5.2 3.9 3.7 3.6 (SCH 40)			STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)	JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC; BC6 JIS H5111 (EQUIV. TO ASTM B62) STEM; SUS304 (EQUIV. TO ASTM A276 Tp304)			45°C (113°F)	4K (57psi)
L.O. TRANSFER PUMP & OTHER PUMP SUCTION LINE PARKERIZING (2L-1~20)	25 20 15	1 ¾ ½	34.0 27.2 21.7	3.4 2.9 2.8									45°C (113°F)	1K (14psi)
L.O. TRANSFER LINE (PUMP DIS. & LOADING LINE) PARKERIZING (2L-31~60)	10 6	⅜ ¼	17.7 10.5	3.2 2.4 (SCH 80)		JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50 A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 20K (285psi)	FORGED STEEL ASTM A105	DISC & STEM STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50 A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	45°C (113°F)	4K (57psi)

5131009

MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131009

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
L.O. TANK SOUNDING LINE (6L-1~10)	200 150 125 100 80	8 6 5 4 3	216.3 165.2 139.8 114.3 89.1	8.2 7.1 6.6 6.0 5.5	SEAMLESS CARBON STEEL PIPE STPG38-S Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 GrA S)	10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)	JIS 10K (143psi)	SOUNDING HEAD; CAST BRONZE BC6 JIS H 5111 (EQUIVALENT TO ASTM B62) AIR VENT HEAD; DUCTILE CAST IRON FCD 45 JIS G 5502 (EQUIVALENT TO ASTM A395)	—	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	45°C (113°F)	1K (14psi)
L.O. OPEN DRAIN & AIR VENT LINE (7L-1~130) (7L-201~250)	65 50 40 32 25 20 15	2½ 2 1½ 1¼ 1 ¾ ½	76.3 60.5 48.6 42.7 34.0 27.2 21.7	5.2 3.9 3.7 3.6 3.4 2.9 2.8 (SCH 40)										
	10 6	⅜ ¼	17.3 10.5	3.2 2.4 (SCH 80)		JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50 A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 20K (285Psi)	FORGED STEEL ASTM A105	DISC & STEM STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50 A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)		

5131009

SLEEVE JOINT

According to the yard's standard practice,
Welding sleeve joints may be used with the limitation as mentioned hereafter.

1 Piping system to be applied

~~Exhaust steam line~~
~~Steam drain line~~ ~~(5D)~~
~~Exhaust gas line~~
~~Condensate water line~~

All air vent line
All open ended drain line
~~Apen bilge scupper line~~

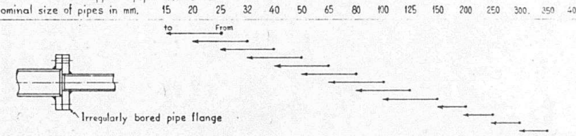
2 Nominal diameter of the pipe
15 mm and over

Reducing method of pipe diameter

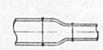
In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

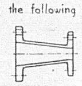
1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the difference of pipe size is within the following limits. → Irregulaly bored pipe flanges shall only be used for vent piping, air piping and scupper pipe line.

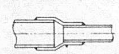
Nominal size of pipes in mm. 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400

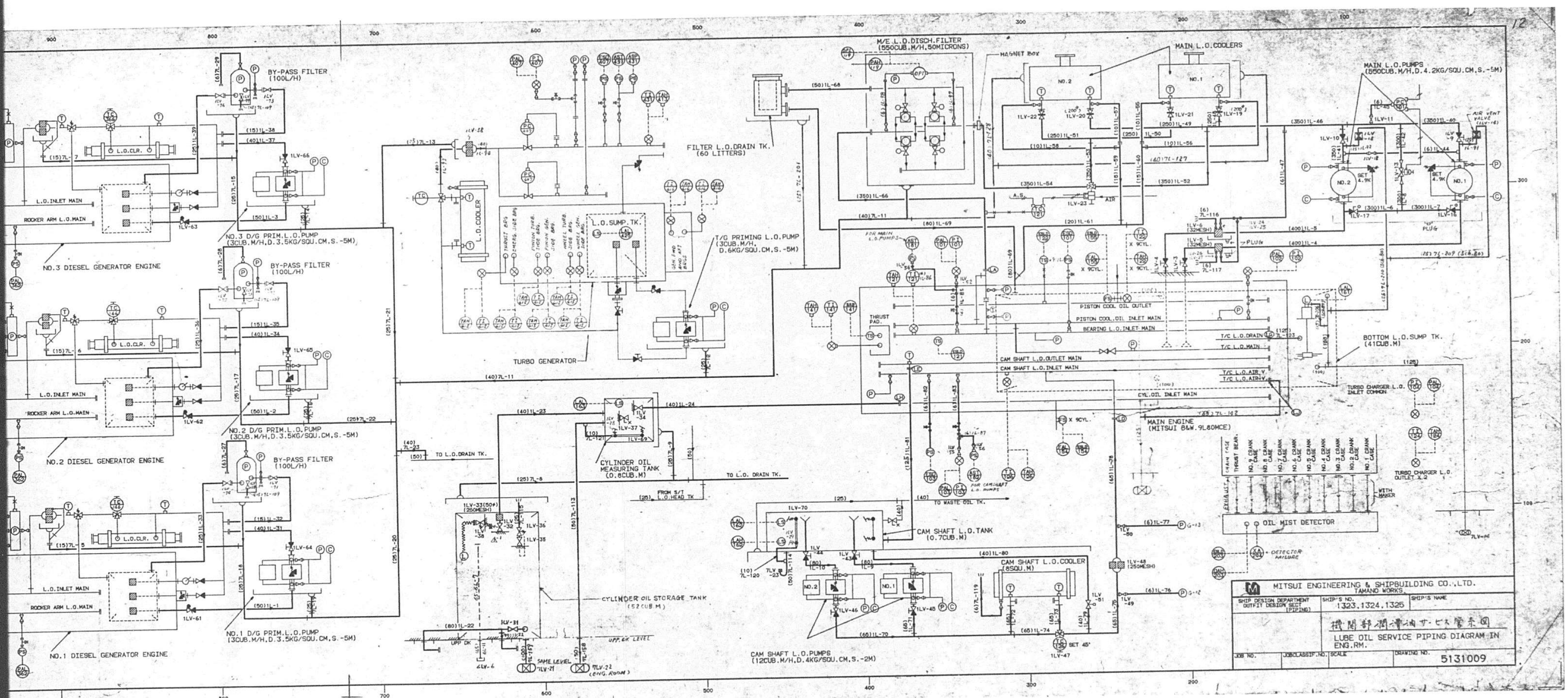


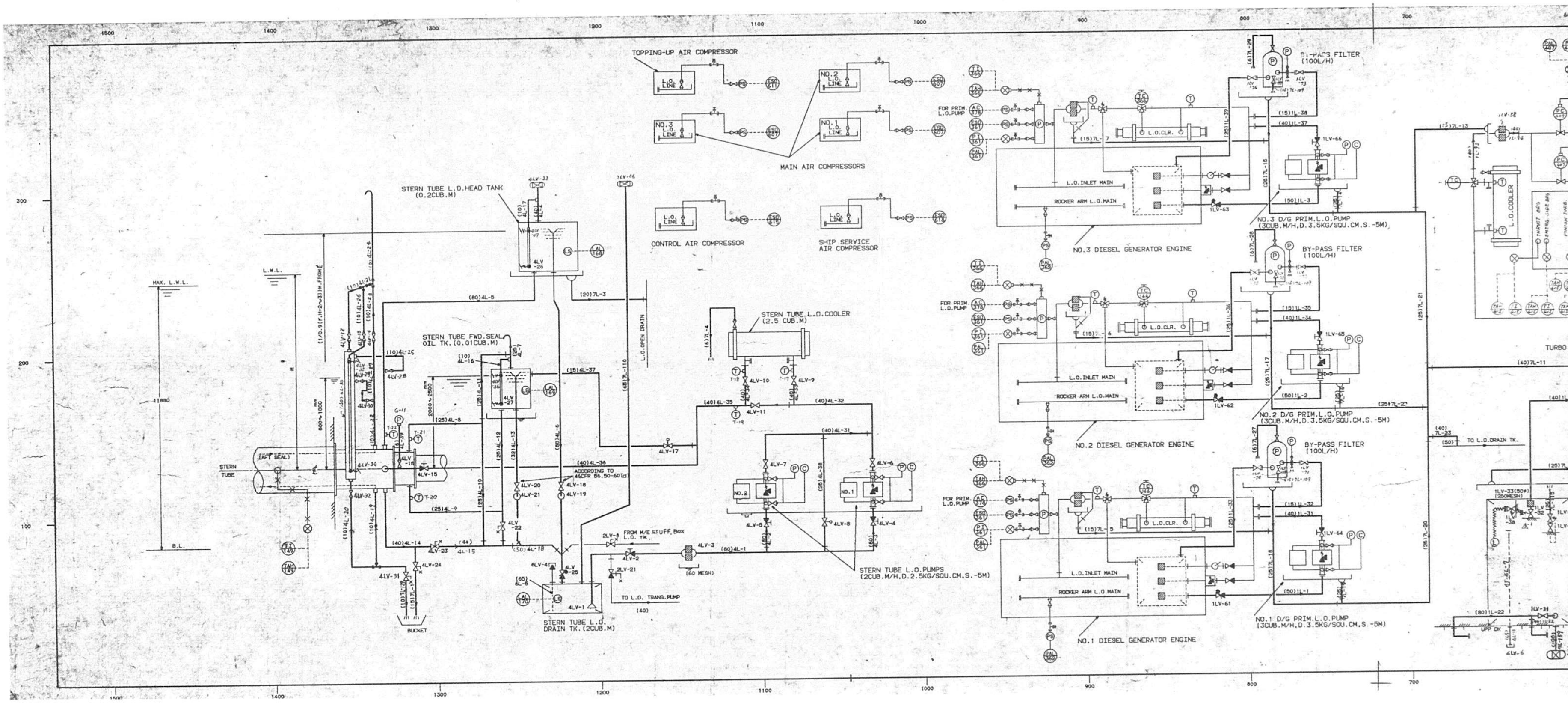
2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.


Butt welding concentric reducer.


Flange ended reducer


Braising reducer


BY-PASS FILTER (100L/H)
L.O.CLR.
L.O.INLET MAIN
ROCKER ARM L.O.MAIN
NO.3 D/G PRIM.L.O.PUMP (3CUB.M/H.D.3.5KG/SQU.CM.S.-5M)
NO.3 DIESEL GENERATOR ENGINE
NO.2 D/G PRIM.L.O.PUMP (3CUB.M/H.D.3.5KG/SQU.CM.S.-5M)
NO.2 DIESEL GENERATOR ENGINE
NO.1 D/G PRIM.L.O.PUMP (3CUB.M/H.D.3.5KG/SQU.CM.S.-5M)
NO.1 DIESEL GENERATOR ENGINE
L.O.COOLER
L.O.SUMP.TK.
TURBO GENERATOR
FILTER L.O.DRAIN TK. (60 LITTERS)
T/G PRIMING L.O.PUMP (3CUB.M/H, D.6KG/SQU.CM.S.-5M)
TO L.O.DRAIN TK.
CYLINDER OIL MEASURING TANK (0.8CUB.M)
CYLINDER OIL STORAGE TANK (52CUB.M)
FROM S/T L.O.HEAD TK
TO WASTE OIL TK.
M/E L.O.DISCH.FILTER (550CUB.M/H,50MICRONS)
MAIN L.O.COOLERS
MAIN L.O.PUMPS (550CUB.M/H.D.4.2KG/SQU.CM.S.-5M)
THRUST PAD.
PISTON COOL OIL OUTLET
PISTON COOL OIL INLET MAIN
BEARING L.O.INLET MAIN
T/C L.O.DRAIN
T/C L.O.MAIN
CAM SHAFT L.O.OUTLET MAIN
CAM SHAFT L.O.INLET MAIN
CYL.OIL INLET MAIN
BOTTOM L.O.SUMP TK. (41CUB.M)
TURBO CHARGER L.O. INLET COMMON
TURBO CHARGER L.O. OUTLET
MAIN ENGINE (MITSUI B&W.9L80MCE)
OIL MIST DETECTOR
DETECTOR FAILURE
CAM SHAFT L.O.TANK (0.7CUB.M)
CAM SHAFT L.O.COOLER (6SQU.M)
CAM SHAFT L.O.PUMPS (12CUB.M/H.D.4KG/SQU.CM.S.-2M)
SET 45°
MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT
OUTFIT DESIGN SECT (PIPING)
SHIP'S NO. 1323.1324.1325
SHIP'S NAME
機関部潤滑油サービス管系図
LUBE OIL SERVICE PIPING DIAGRAM IN ENG.RM.
JOB NO.
JOBCLASSIF.NO.
SCALE
DRAWING NO. 5131009



TOPPING-UP AIR COMPRESSOR
MAIN AIR COMPRESSORS
CONTROL AIR COMPRESSOR
SHIP SERVICE AIR COMPRESSOR
STERN TUBE L.O.HEAD TANK (0.2CUB.M)
STERN TUBE FWD.SEAL OIL TK.(0.01CUB.M)
STERN TUBE L.O.COOLER (2.5 CUB.M)
STERN TUBE L.O.PUMPS (2CUB.M/H,D.2.5KG/SQU.CM,S.-5M)
STERN TUBE L.O. DRAIN TK.(2CUB.M)
STERN TUBE
MAX. L.W.L.
L.W.L.
B.L.
BUCKET
TO L.O. TRANS.PUMP
(60 MESH)
L.O.OPEN DRAIN
FOR PRIM L.O.PUMP
L.O.CLR.
L.O.INLET MAIN
ROCKER ARM L.O.MAIN
BY-PASS FILTER (100L/H)
NO.3 DIESEL GENERATOR ENGINE
NO.3 D/G PRIM.L.O.PUMP (3CUB.M/H,D.3.5KG/SQU.CM,S.-5M)
NO.2 DIESEL GENERATOR ENGINE
NO.2 D/G PRIM.L.O.PUMP (3CUB.M/H,D.3.5KG/SQU.CM,S.-5M)
NO.1 DIESEL GENERATOR ENGINE
NO.1 D/G PRIM.L.O.PUMP (3CUB.M/H,D.3.5KG/SQU.CM,S.-5M)
TO L.O.DRAIN TK.
L.O.COOLER
TURBO GE

APPROVAL OF OWNER & REGULATORY BODIES

ALT . NO.	OWNER		ABS			
	DATE	LETTER NO.	DATE	LETTER NO.	DATE	LETTER NO.
ORIGINAL	MAR. 13 '85	OFTS/NAB/JS	APR. 19 '85	T-8-2		
REV. 01	AUG. 23 '85	OFTS/MES-897	SEP. 20 '85	T-8-2		

FINISHEDPLAN

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SHIPYARD AND SHIP'S NO. & NAME			
MITSUI TAMANO		MITSUBISHI KOBE	
NO.1323	DOCTOR LYKES	NO.1158	JAMES LYKES
NO.1324	ALMERIA LYKES	NO.1159	JOSEPH LYKES
NO.1325	TILLIE LYKES	NO.1164	SOLON TURMAN

MITSUI ENGINEERING & SHIPBUILDING CO.,LTD.
TAMANO WORKS

SHIP DESIGN DEPARTMENT
MANAGER
OUTFIT DESIGN SECT (PIPING)
SEC.CHIEF
ASST.
CHARGE ENG'R
DATE (TEL 2240 ~ 2241)

SHIP'S NO.

SHIP'S NAME: **TILLIE LYKES**

機関部
潤滑油移送、清浄管系図

L.O. TRANSFER & PURIFICATION
PIPING DIAGRAM IN ENG. RM.

JOB NO.	SCALE	LYKES REF. NO.	MITSUI DRAWING NO.	REV.
JOBCLASSIF.NO.		481402	5131012	

(14 SHEETS WITH COVER)

1

PLAN RECORD

ALT. NO.	MARK	ALTERATION/DESCRIPTION	DATE & SIGNATURE
		PREPARED FOR S.No. 1323 AS FINISHED PLAN, MADE APPLICABLE TO S.No. 1324 AND S.No. 1325.	JUN. 26 '86

5131012

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GENERAL NOTE

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REFERENCE

NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
	480001	4116002	PIPING PRACTICE
	190102	4116003	PIPE COLOUR IDENTIFICATION SCHEDULE
	482601	4116004	COMPARISON TABLE OF ASTM & JIS MATERIAL FOR PIPE JOINTS
	482602	4116005	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR STEEL PIPE
	482603	4116006	SPECIFICATION AND COMPARISION TABLE (JIS/ASTM) OF BOLTS & NUTS.
	482604	4116007	SPECIFICATION OF NON STANDARD PIPE JOINTS FOR COPPER PIPES
	482605	5131201	FABRICATION METHOD FOR PIPING (WELDING, BRAZING PROCEDURE)
	482606	5131202	COMPARISON TABLE OF JIS & ASTM MATERIAL FOR PIPE (HULL & MACHINERY PART)
	482607	5131203	CALCULATION SHEET OF PIPE WALL THICKNESS FOR PIPING SYSTEM (GENERAL PIPING)
	482608	5131205	GASKET (GENERAL USE)
	482404	5233111	CAST STEEL VALVES
	482406	5233112	FORGED STEEL VALVES
	482407	5233114	BRONZE VALVES

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NO.	REF. NO. (LYKES)	DWG. NO.	DWG. NAME
REFERENCE			
	~~480201~~	~~S131001~~	~~FEED & CONDENSATE PIPING DIAGRAM IN ENG. RM~~
	481001	S131002	STEAM AND EXHAUST PIPING DIAGRAM IN ENG. RM
	480802	S131008	STEAM DRAIN PIPING DIAGRAM IN ENG. RM
	481401	S131009	L.O. SERVICE PIPING DIAGRAM IN ENG. RM
	~~481402~~	~~S131012~~	L.O. TRANSFER & PURIFICATION PIPING ~~DIAGRAM IN ENG. RM~~
	481501	S131013	F.O. SERVICE PIPING DIAGRAM IN ENG. RM
	481509	S131014	F.O. TRANSFER PIPING DIAGRAM IN ENG. RM
	481502	S131015	F.O. PURIFICATION PIPING DIAGRAM IN ENG. RM
	~~480403~~	~~S131016~~	~~COOLING F.W. PIPING DIAGRAM IN ENG. RM~~
	~~480501~~	~~S131018~~	COOLING S.W. & S.W. SERVICE PIPING ~~DIAGRAM IN ENG. RM~~
	~~480301~~	~~S131019~~	FIRE G.S. & BALLAST PIPING ~~DIAGRAM IN ENG. RM~~
	480102	S131020	BILGE & WASTE OIL DISPOSAL PIPING DIAGRAM IN ENG. RM
	480401	S131023	F.W. SERVICE PIPING DIAGRAM IN ENG. RM
	~~481802~~	~~S131026~~	~~COMPRESSED AIR PIPING DIAGRAM IN ENG. RM~~
	~~481803~~	~~S131025~~	~~CONTROL AIR PIPING DIAGRAM IN ENG. RM~~
	~~481806~~	~~S131026~~	MAIN ENGINE REMOTE CONTROL AIR PIPING ~~DIAGRAM IN ENG. RM~~
	~~520001~~	~~S131030~~	~~EXHAUST GAS PIPING DIAGRAM IN ENG. RM~~

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CODED GROUP SYSTEM OF PIPING DIAGRAM

管系 (SYSTEM) \ 区分 (DIVISION)	記号および番号 (DIVISION OF SYMBOL NUMBER) 管 (PIPE)	弁,コック,こし器 (VALVE, COCK
潤滑油移送管系		
L.O. TRANSFER PIPING	2L-1 ~ 100	2LV-1 ~ 100
潤滑油清浄管系		
L.O. PURIFYING PIPING	5L-1 ~ 100	5LV-1 ~ 100
潤滑油測深管系		
L.O. SOUNDING PIPING	6L-1 ~ 100	6LV-1 ~ 100
潤滑油大気開放ドレン,空気抜管系		
L.O. ATMOS OPEN DRAIN & AIR VENT PIPING	7L-1 ~ 200	7LV-1 ~ 200

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MITSUI ENGINEERING & SHIPBUILDING CO., LTD.

SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
TTING		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
		SLEEVE TYPE	
		BELLOWS TYPE	
PAN-SION INT		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICA-TOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	●:WITH STOP VALVE ○:WITHOUT VALVE :WITH SELF CLOSING VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	
		FLAT GLASS LEVEL GAUGE	
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE; TANK
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	
	L	LEVEL INDICATOR	
	VS	VISCOSITY INDICATOR	
	P	PRESSURE GAUGE	
	C	COMPOUND GAUGE	
	V	VACUUM GAUGE	
	Pd	DIFF. PRESS. GAUGE	
	T	THERMOMETER	
	T	REMOTE THERMOMETER	
	F	FLOW METER	

KIND	SYMBOL	NAME	REMARK
DETEC-TOR	PS	PRESSURE SWITCH	
	TS	TEMPERATURE SWITCH	
	LS	LEVEL (FLOAT) SWITCH	
	FS	FLOW SWITCH	
	SC	SALINITY CELL	
	⊗	ANALOGUE TRANSMITTER	PRESSURE, TEMPERATURE, LEVEL, ETC.
	MS	MICRO LIMIT SWITCH	
PUMPING DEVICE		AIR DRIVEN PISTON PUMP	
		EJECTOR, EDUCTOR	
		HAND PUMP	
OTHER		FAUCET	
		DRAIN SILENCER	
		SEAL POT	
		LOOP SEAL	

KIND	SYMBOL	NAME	REMARK
SAMPLE		----SYMBOL ----INSTRUMENT NO.	
INDICA-TOR	PI	PRESSURE INDICATOR	
	VI	VACUUM INDICATOR	
	CI	COMPOUND INDICATOR	
	PdI	DIFF. PRESS. INDICATOR	
	TI	TEMPERATURE INDICATOR	
	LI	LEVEL INDICATOR	
	VSI	VISCOSITY INDICATOR	
	DI	DENSITY INDICATOR	
	[illegible]	SALINITY INDICATOR	
	FI	FLOW INDICATOR	
	XI	OTHER INDICATOR	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.
CONTROL	PC	PRESSURE CONTROL	
	TC	TEMPERATURE CONTROL	
	LC	LEVEL CONTROL	
	VSC	VISCOSITY CONTROL	
	AC	AUTOMATIC CONTROL	
	ESD	EMER. SHUT DOWN	
	[illegible]	EMER. SLOW DOWN	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
	AST	AUTOMATIC START	
	ASP	AUTOMATIC STOP	
	[illegible]	AUTOMATIC START & STOP	

KIND	SYMBOL	NAME	REMARK
ALARM	PAH	HIGH PRESSURE ALARM	
	PAL	LOW PRESSURE ALARM	
	[illegible]	HIGH DIFF. PRESS. ALARM	
	TAH	HIGH TEMPERATURE ALARM	
	TAL	LOW TEMPERATURE ALARM	
	[illegible]	TEMP. DEVIATION HIGH ALARM	
	LAH	HIGH LEVEL ALARM	
	LAL	LOW LEVEL ALARM	注：SET値は自動化一覧表に記載するので系統図には記入しない INFORMATION FOR DESIGN STAFF.
	VSAH	HIGH VISCCSITY ALARM	
	VSAL	LOW VISCOSITY ALARM	
	DAH	HIGH DENSITY ALARM	
	[illegible]	HIGH SALINITY ALARM	
	FAH	OVER FLOW ALARM	
	FAL	NON FLOW ALARM	
	XA	GENERAL ABNORMAL ALARM	注：用途を記入する OBJECT TO BE DESCRIBED IN LOWER HALF.

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SYMBOL MARK TABLE

KIND	SYMBOL	NAME	REMARK
VALVE		STOP VALVE	:REMOTE OPERAT
		GATE (SLUICE) VALVE	:BUTT OR SOCKET WELDING ENDED
		BUTTERFLY VALVE	:UNION ENDED
		NEEDLE OR V-PORT VALVE (WITH STOPPER)	
		DIAPHRAGM VALVE	:LOCKED CLOSE
		SCREW DOWN CHECK VALVE	:LOCKED OPEN
		LIFT CHECK VALVE	
		SWING CHECK VALVE	
		FLOAT CHECK VALVE	
		FOOT VALVE	EXAMPLE:
		PRESS. REDUCING VALVE DIRECT OPERATING TYPE	
		SAFETY VALVE	
		RELIEF VALVE	
		PRESSURE TEST VALVE	
		EMER. SHUT-OFF VALVE (AIR OPERATED)	
		HOSE VALVE	
		SELF CLOSING VALVE	
		ROTARY TYPE THREE WAY VALVE	
		THREE WAY VALVE	
		MANIFOLD VALVE	:NON RETURN
COCK		TWO-WAY COCK	:LOCKED CLOSE
		THREE-WAY COCK	:LOCKED OPEN
		FOUR-WAY COCK	
		SIX-WAY COCK (COMBINED 3-WAY COCKS)	

KIND	SYMBOL	NAME	REMARK
VALVE ACTUATOR		DIAPHRAGM TYPE	:WITH POSITIONER
		PISTON TYPE (ON-OFF CONTROL)	:WITH POSITIONER
		PISTON TYPE (OPEN DEGREE CONTROL)	
		ELECTRIC MOTOR TYPE	:WITH MANUAL HANDLE
		AIR MOTOR TYPE	
		SOLENOID TYPE.	
		WEIGHT TYPE	
		FLOAT TYPE	
		WAX TYPE	
STRAINER		SIMPLEX STRAINER	注：メッシュを指示する
		DUPLEX STRAINER	
		Y-TYPE STRAINER	
		ROSE BOX	
		MUD BOX	
		FILTER REGULATOR	
		SEPARATOR	
		STEAM OR AIR TRAP (WITH STRAINER & DRAIN VALVE)	
JOINT		FLANGE TYPE	
		WELDED TYPE (BUTT OR SOCKET)	
		UNION TYPE	
		REDUCER	
		HOSE COUPLING	
		BLIND FLANGE	

KIND	SYMBOL	NAME	REMARK
FITTING		CHAMBER	
		SIGHT GLASS	
		CAP TYPE SOUNDING HEAD	
		SELF CLOSE-COCK TYPE SOUNDING HEAD	:WITH FOOT PEDAL
		AIR VENT PIPE	
		AIR VENT PIPE HEAD (WITHOUT WIRE NET)	:FOR WATER TK
		AIR VENT PIPE HEAD (WITH WIRE NET)	:FOR OIL TK
		CHANGE OVER PIECE	
		SUCTION BELLMOUTH	
		HOPPER	:WITH COVER
		SCUPPER FOR OIL TRAY OR DECK	
		SCREWED BOSS (SEAT)	:WITH PLUG
		FUSIBLE PLUG	注：穴径を指示する
		ORIFICE	:NOR. OPEN
		SPECTACLE FLANGE	:NOR. CLOSE
		DECK FILLING PIECE	
		DECK FILLING CAP	
		LOOP SEAL FOR GAUGE PIPE	
		PENETRATION PIECE	
		AIR OR STEAM HORN	
		DECK FILLING PIECE	
EXPANSION JOINT		SLEEVE TYPE	
		BELLOWS TYPE	
		DRESSER TYPE	
		SPOOL TYPE	
		LOOP TYPE	

KIND	SYMBOL	NAME	REMARK
LINE		PIPING	
		REFER TO OTHER DRAWING	※:ACCORDING TO DRAWING OF HULL PART
		SUBCONTRACTOR'S PIPING	
		FLEXIBLE TUBE	
		CAPILLARY TUBE	
		ELECTRIC CABLE	
		OPEN END	
		OVERBOARD DIS-END	
		CONTROL AIR PIPING	
		HYDRAULIC PIPING	
LOCAL INDICATOR		GLASS LEVEL GAUGE (SEETRU GAUGE)	●:WITH STOP VALVE ○:WITHOUT VALVE ●→:WITH SELF CLOSING VALVE
		GLASS LEVEL GAUGE (MARINE GAUGE)	
		FLAT GLASS LEVEL GAUGE	
		FLAT GLASS LEVEL GAUGE	
		FLOAT LEVEL GAUGE (ROD TYPE)	
		FLOAT LEVEL GAUGE (INNER FLOAT TYPE)	EXAMPLE: TANK
		FLOAT LEVEL GAUGE (OUTER FLOAT TYPE)	
	L	LEVEL INDICATOR	
	VS	VISCOSITY INDICATOR	
	P	PRESSURE GAUGE	
	C	COMPOUND GAUGE	
	V	VACUUM GAUGE	
	Pd	DIFF. PRESS. GAUGE	
	T	THERMOMETER	
	T	REMOTE THERMOMETER	
		FLOW METER	

KIND	SYMBOL	NAME
DETECTOR	PS	PRESSURE SWITCH
	TS	TEMPERATURE SWITCH
	LS	LEVEL (FLOAT) SWITCH
	FS	FLOW SWITCH
	SC	SALINITY CELL
		ANALOGUE TRANSMITTER
	MS	MICRO LIMIT SWITCH
PUMPING DEVICE		AIR DRIVEN PISTON PUMP
		EJECTOR, EDUCTOR
		HAND PUMP
OTHER		FAUCET
		DRAIN SILENCER
		SEAL POT
		LOOP SEAL

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131012

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
STERN TUBE L.O PUMP SUC. & RETURN LINE PARKERIZING (4L-1~20)	400	16	406.4	9.5	SEAMLESS CARBON STEEL PIPE STPG 38 S JIS G 3454 (EQUIVALENT TO ASTM A53 Gr.A S) (STD)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL ASTM A 105 or BUTT WELDING 10" & OVER	JIS 10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT; SUS FACED ON CAST STEEL OR STAINLESS STEEL SCS13 JIS G 5121 (EQUIV. TO ASTM A351 CF8) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62) STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	55°C (131°F)	1K (14psi)
	350	14	355.6	9.5										
	300	12	318.5	9.5										
	250	10	267.4	9.3										
	200	8	216.3	8.2										
STERN TUBE L.O PUMP DIS. LINE PARKERIZING (4L-31~40)	150	6	165.2	7.1								PARKERIZING	45°C (113°F)	3K (43psi)
	125	5	139.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5	PARKERIZING									
	65	2½	76.3	5.2										
	50	2	60.5	3.9	(Sch 40)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)							
L.O. PURIFIED LINE (PUMP SUC.) (5L-1~30)	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC; BC6 JIS H5111 (EQUIV. TO ASTM B62) STEM; SUS 304 (EQUIV. TO ASTM A276 Tp304)			45°C (113°F)	1K (14psi)
	32	1¼	42.7	3.6										
L.O. PURIFIED LINE (FEED PUMP DIS. TO HEATER) (5L-31~80)	25	1	34.0	3.4									45°C (113°F)	3K (43psi)
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
L.O. PURIFIER HEATER OUTLET (5L-81~130)	10	⅜	17.3	3.2	(Sch 80)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 20K (285psi)	FORGED STEEL ASTM A105	DISC & STEM STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	95°C (203°F)	3K (43psi)
	6	¼	10.5	2.4										

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131009

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
HULL L.O. TANK AIR VENT LINE (IN ENGINE ROOM) (7L-131~150)	150	6	165.2	7.1	WELDED CARBON STEEL PIPE STPG 38-E JIS G 3454 (EQUIVALENT TO ASTM A53 Gr.A-E) (Sch 40)	10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)	JIS 10K (143psi)	SOUNDING HEAD; CAST BRONZE BC6 JIS H5111 (EQUIVALENT TO ASTM B62) AIR VENT HEAD; DUCTILE CAST IRON FCD 45 JIS G 5502 (EQUIVALENT TO ASTM A395)	—	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	45°C (113°F)	1K (14psi)
	125	5	139.8	6.6										
	100	4	114.3	6.0										
L.O. TANK SOUNDING LINE (ON EXPOSED DK) (6L-11~20)	80	3	89.1	5.5										
	65	2½	76.3	5.2										
	50	2	60.5	5.5	(Sch 80)									
HULL L.O. TANK AIR VENT LINE (ON EXPOSED DK.) GALVANIZED (7L-151~160)	150	6	165.2	11.0	WELDED CARBON STEEL PIPE STPG 38-E (Sch 80) JIS G 3454 (EQUIVALENT TO ASTM A53 Gr.A-E)									
	125	5	139.8	9.5										
	100	4	114.3	8.6										
	80	3	89.1	7.6										
	65	2½	76.3	7.0										
	50	2	60.5	5.5										

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131012

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
MAIN L.O PUMP & OTHER PUMP SUC. & RETURN LINE (1L-1~30)	400	16	406.4	9.5	SEAMLESS CARBON STEEL PIPE STPG 38 S JIS G 3454 (EQUIVALENT TO ASTM A53 Gr.A S) (STD)	JIS 10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITH HUB FORGED STEEL ASTM A105 or BUTT WELDING 10" & OVER	JIS 10K (143psi)	CAST STEEL FLANGED SC46 or 49 JIS G 5101 (EQUIVALENT TO ASTM A216 WCA or WCB)	DISC & SEAT; SUS FACED ON CAST STEEL OR STAINLESS STEEL SCS13 JIS G 5121 (EQUIV. TO ASTM A351 CF8) OR BC6 JIS H5111 (EQUIVALENT TO ASTM B62) STEM; STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	55°C (131°F)	1K (14psi)
	350	14	355.6	9.5										
	300	12	318.5	9.5										
MAIN L.O. PUMP & D/G PRIMING L.O. PUMP DIS. LINE (1L-31~100)	250	10	267.4	9.3									45°C (113°F)	4K (57psi)
	200	8	216.3	8.2										
	150	6	165.2	7.1										
	125	5	139.8	6.6	PARKERIZING							PARKERIZING		
	100	4	114.3	6.0			STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)							
CAM SHAFT L.O. PUMP DIS. LINE (1L-101~120)	80	3	89.1	5.5									45°C (113°F)	4K (57psi)
	65	2½	76.3	5.2										
	50	2	60.5	3.9	(SCH 40)									
	40	1½	48.6	3.7				JIS 16K (228psi)	CAST BRONZE FLANGED BC6 JIS H5111 (EQUIVALENT TO ASTM B62)	DISC; BC6 JIS H5111 (EQUIV. TO ASTM B62) STEM; SUS 304 (EQUIV. TO ASTM A276 Tp304)				
	32	1¼	42.7	3.6										
L.O. TRANSFER PUMP & OTHER PUMP SUCTION LINE (2L-1~30)	25	1	34.0	3.4									45°C (113°F)	1K (14psi)
	20	¾	27.2	2.9										
	15	½	21.7	2.8										
L.O. TRANSFER LINE (PUMP DIS. & LOADING LINE) (2L-31~100)	10	⅜	17.3	3.2	(SCH 80)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 20K (285psi)	FORGED STEEL ASTM A105	DISC & STEM STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	45°C (113°F)	4K (57psi)
	6	¼	10.5	2.4										

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MATERIAL TABLE (S. No. 1323/4/5) REFERENCE DWG. No. 5131012

SYSTEM	NOM. SIZE mm	NOM. SIZE inch	PIPE OUT.DIA mm	PIPE THICK mm	PIPE MATERIAL	FLANGE PRESS. STAND	FLANGE TYPE & MATERIAL	VALVE & COCK PRESS. STAND	VALVE & COCK MATERIAL BODY	VALVE & COCK MATERIAL TRIM	PIECE PRESS. STAND	PIECE MATERIAL	MAX WORK'G TEMP. °C	MAX WORK'G PRESS. Kgf/cm²
L.O. TANK SOUNDING LINE (6L-1~10)	200	8	216.3	8.2	SEAMLESS CARBON STEEL PIPE STPG 38-S Sch40 JIS G 3454 (EQUIVALENT TO ASTM A53 Gr.A S)	10K (143psi)	STEEL SLIP-ON WELDED FLANGE WITHOUT HUB ROLLED STEEL PLATE SS41 (JIS G 3101) (EQUIVALENT TO ASTM A36)	JIS 10K (143psi)	SOUNDING HEAD; CAST BRONZE BC6 JIS H5111 (EQUIVALENT TO ASTM B62) AIR VENT HEAD; DUCTILE CAST IRON FCD 45 JIS G 5502 (EQUIVALENT TO ASTM A395)	—	JIS 10K (143psi)	BRANCH FABRICATED BY WELDING PIPE TO PIPE	45°C (113°F)	1K (14psi)
	150	6	165.2	7.1										
	125	5	139.8	6.6										
	100	4	114.3	6.0										
	80	3	89.1	5.5										
L.O. OPEN DRAIN & AIR VENT LINE (7L-1~130) (7L-201~250)	65	2½	76.3	5.2										
	50	2	60.5	3.9										
	40	1½	48.6	3.7										
	32	1¼	42.7	3.6										
	25	1	34.0	3.4										
	20	¾	27.2	2.9										
HULL L.O. TANK AIR VENT LINE (IN ENGINE ROOM) (7L-131~150)	15	½	21.7	2.8										
HULL L.O. TANK AIR VENT LINE (ON EXPOSED DK) GALVANIZED (7L-151~160)	10	⅜	17.3	3.2	(SCH 80)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF 50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)	JIS 20K (285psi)	FORGED STEEL SCREWED (ASTM A105)	DISC & STEM STAINLESS STEEL SUS 304 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 304)	JIS 30K (428psi)	FORGED STEEL GRIP JOINT SF50A (ASTM A105) OR STAINLESS STEEL GRIP JOINT SUS 316 JIS G 4303 (EQUIVALENT TO ASTM A276 TYPE 316)		
	6	¼	10.5	2.4										

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SLEEVE JOINT

According to the yard's standard practice, Welding sleeve joints may be used with the limitation as mentioned hereafter.

1 Piping system to be applied

~~Exhaust steam line~~
~~Steam drain line (5D)~~
~~Exhaust gas line~~
~~Condensate water line~~

All air vent line (6L.7L)
All open ended drain line (6L.7L)
~~Open bilge scupper line~~

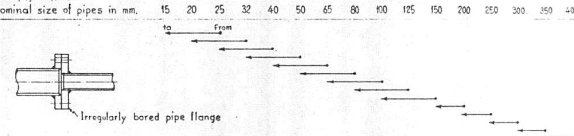
2 Nominal diameter of the pipe
15mm and over

Reducing method of pipe diameter

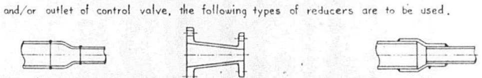
In case of a pipe line is requested to reduce its diameter, the following shipyard practice shall in general be applied.

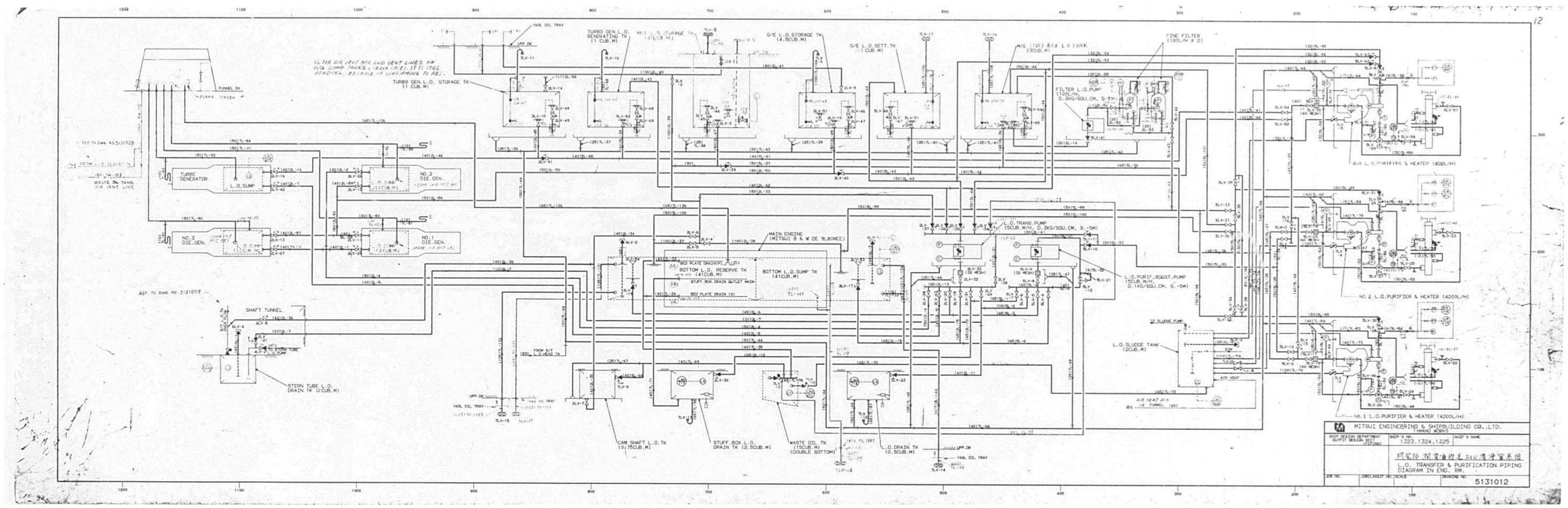
1. Irregularly bored pipe flanges are to be used on reduced pipes in case of the difference of pipe size is within the following limits. → *Irregulaly bored pipe flange shall only be used for vent piping, air piping and scupper pipe line.*

Nominal size of pipes in mm. 15 20 25 32 40 50 65 80 100 125 150 200 250 300 350 400



2. Where the difference of pipe size is beyond the above mentioned limits, and where smooth flow is especially desired such as inlet and/or outlet of control valve, the following types of reducers are to be used.





TURBO GEN. L.O. RENOVATING TK (1 CUB.M)
TURBO GEN. L.O. STORAGE TK (1 CUB.M)
G/E L.O. STORAGE TK (4.5CUB.M)
G/E L.O. SETT. TK
FINE FILTER
FILTER L.O. PUMP
TURBO GENERATOR
L.O. SUMP
NO.2 DIE. GEN.
NO.3 DIE. GEN.
NO.1 DIE. GEN.
MAIN ENGINE
BOTTOM L.O. RESERVE TK (41CUB.M)
BOTTOM L.O. SUMP TK (41CUB.M)
L.O. TRANS. PUMP
L.O. PURIF. BOOST. PUMP
L.O. SLUDGE TANK (2CUB.M)
SHAFT TUNNEL
STERN TUBE L.O. DRAIN TK (2CUB.M)
CAM SHAFT L.O. TK (0.75CUB.M)
STUFF. BOX L.O. DRAIN TK (2.5CUB.M)
WASTE OIL TK (15CUB.M) (DOUBLE BOTTOM)
L.O. DRAIN TK (0.5CUB.M)
NO.2 L.O. PURIFIER & HEATER (4200L/H)
NO. 1 L.O. PURIFIER & HEATER (4200L/H)
MITSUI ENGINEERING & SHIPBUILDING CO., LTD.
TAMANO WORKS
SHIP DESIGN DEPARTMENT
OUTFIT DESIGN SECT (PIPING)
SHIP'S NO.
1323, 1324, 1325
SHIP'S NAME
L.O. TRANSFER & PURIFICATION PIPING
DIAGRAM IN ENG. RM.
JOB NO.
SCALE
DRAWING NO.
5131012

1766

END

ROLL NO. 3